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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

1924

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Traumatic Occlusion—*Bricker*

Community Dental Service—*Davis*

Progress of Mouth Hygiene—*O'Neill*

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EDITORIAL

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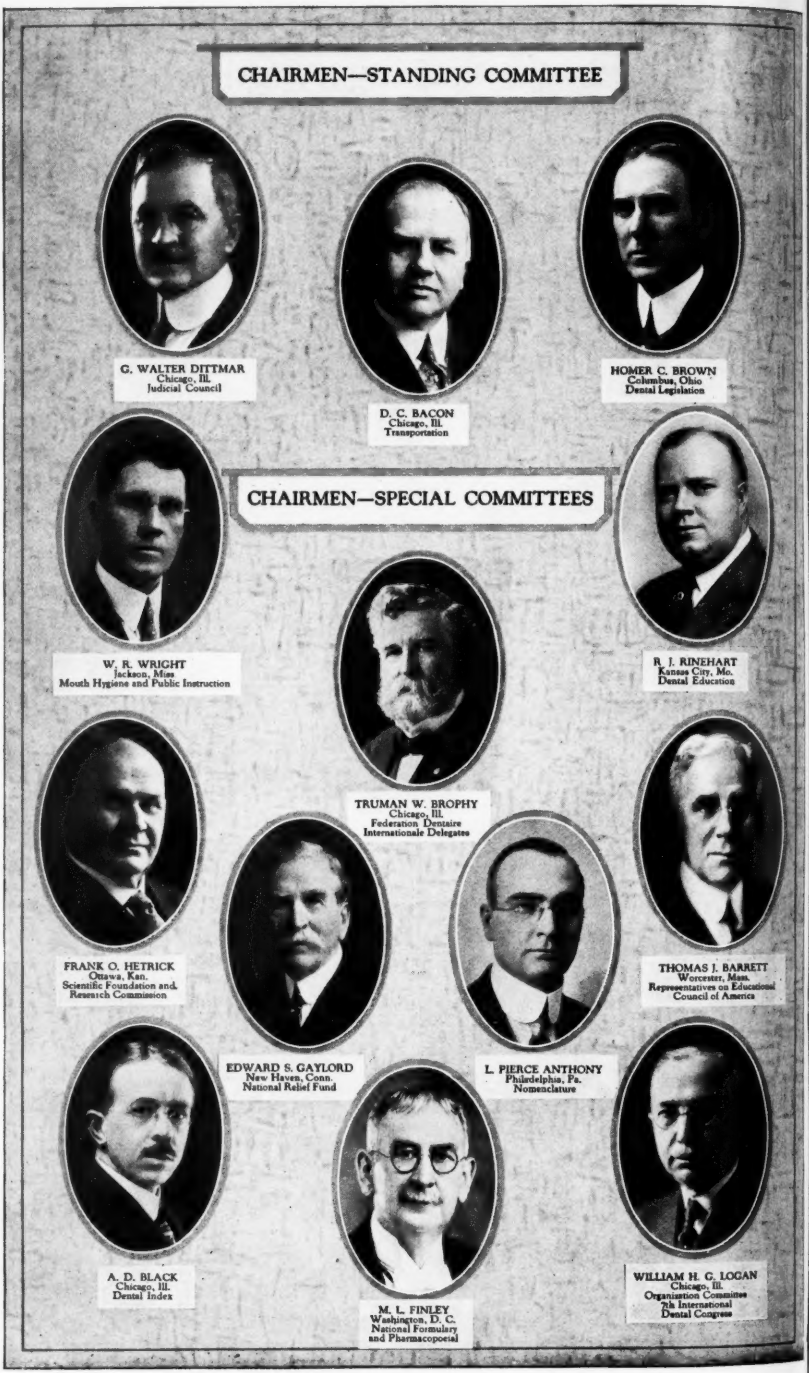
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Original Communications

SURGERY OF THE ANTRUM OF HIGHMORE

By VIRGIL LOEB, A.B., M.D., D.D.S., St. Louis, Missouri

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THE diseases of the maxillary sinus (antrum of Highmore) concern both the stomatologist and the rhinologist, for the alveolus constitutes its floor and the nasal cavity provides its drainage. As the floor of the sinus is involved in its diseases less frequently than are its nasal connections, its therapeutics is more often a matter of rhinologic than stomatologic indication and attention.

The sinus is pyramidal in shape with the base directed toward the nasal fossa, and the apex toward the malar bone. The apices of the roots of the upper second bicuspid and the first and second molar teeth often lie very close to the floor, and sometimes perforate it. The roof constitutes the floor of the orbit. The maxillary sinuses vary in shape and size in different persons, as well as in the same person. In June, 1912, I presented before the Section on Stomatology of the American Medical Association at Atlantic City a study of the cubic capacity and superficial area of the maxillary sinuses. In this report, which was made from a study of twenty-one heads in cross section, the following observations were noted: The extremes in cubic capacity were 4.5 c. c. in one head as compared with 24.8 c. c. in another. The extremes in one head were 12.5 c. c. on the right side as compared to 18.5 c. c. on the left, and the general average of all heads was 12.94 c. c. The extremes in superficial area were 12.1 square cm. in one head as compared with 52.3 square cm. in another. The extremes in superficial area in the same head were 36.9 square cm. on the right side as compared with 27.3 square cm. on the left,

and the general average for all heads was 31.68 square cm. In conjunction with the report, I showed reproductions in plaster of Paris of the sinuses.

The variety of size and shape shows the need of careful study when certain types of operations are contemplated. The irregularity of the floor and the presence of bony septums which divide the cavity into pockets explain the unsatisfactory drainage resulting from puncturing through the alveolus.

A study of the casts aids further in the interpretation of roentgenograms of the skull, particularly those made in an anteroposterior direction. Frequently the variation in size in the same skull suggests a pathologic condition, although it may be normal for that particular individual. It is not uncommon to find a large, well defined sinus on one side with an almost entire absence on the other, suggesting an obliteration due to some pathologic process when, as a matter of fact, there is simply a very small sinus on the one side, which in the examination is compared with a much larger one on the other.

The maxillary sinus may be thus approached surgically (1) through the alveolar process, with or without the removal of a tooth; (2) through the anterior wall (cuspid fossa) in the mouth; (3) in the middle or inferior meatus, with or without resection of a part of the inferior turbinate, and (4) by cutting away a part of the margin of the apertura pyriformis through the nose and continuing the excision by removal of a part of the external wall of the nose below the attachment of the inferior turbinate (Canfield's operation). The idea that the cavity should be opened at its lowest point in order to get most perfect drainage has long since been discarded, since it is now known that the best drainage is not obtained through the alveolar process.

Time will not be consumed in discussing in detail the etiology, diagnosis and treatment of all the antral diseases that may require surgical interference. Since empyema affects the sinus much more frequently than any other disease, this will be considered at length. Among those pathologic conditions occurring less frequently are cysts, polypi, syphilis and growths both malignant and benign. In addition to these, injuries may cause fractures of the outer walls and may result in the introduction of foreign bodies into the cavity.

Infection of the antrum causing empyema may be of dental or of nasal origin. Since the mucous membrane lining the cavity is a continuation of that of the nasal cavity, infection in the nose may spread directly to the antrum. Apical infection about the teeth may easily affect the antrum because of the close proximity, and infection may be introduced into the sockets of the teeth during extraction, which may secondarily infect the antrum. Empyema of the antrum resulting from alveolar infection frequently follows the curettement of the apical areas of the molar and bicuspid teeth. It is well to discourage the curettement of sockets particularly in this neighborhood after the removal of teeth, because of the chance of involvement of the sinus.

The diagnosis of maxillary sinus empyema when there is a direct oral communication into the cavity is not difficult. When no such communication exists, the presence of pus in the middle meatus of the nose, together with a study of the symptoms and the roentgenographic finding, usually determines the diagnosis. Care must be taken in differentiating between simple maxillary sinusitis and maxillary sinus empyema. In many cases of sinusitis, operation is performed, and later empyema develops, because care was not taken in making a definite diagnosis. It must not be forgotten that the roentgenogram does not indicate

definitely the presence of pus, and every means available should be used in order to determine this before an operation is advised.

The first one to drain the antrum through the alveolar process was Cowper, in 1707. This method survived for many years. Mikulicz first performed the operation through the nasal wall; while Caldwell, Luc, Denker and others perfected the operation through the facial wall.

The presence of pus in the maxillary sinuses with no tendency to recover spontaneously or by nonoperative treatment, or a frequently recurring maxillary suppuration, is an indication for one of the types of operation. Some treat acute processes involving the maxillary sinuses by a simple puncture through the inferior meatus, followed by irrigation. Others pursue a more expectant plan, relying on washing out the nose and irrigating the sinuses through the natural opening, and on general therapy. The chronicity of the process has much to do with determining the type of operation, though it is a good rule to employ the simple methods first. In early cases, operation through the nasal wall is usually successful. When such operations fail, the Caldwell-Luc or Denker operation should be undertaken; and when these fail, an obliteration operation, such as that described by Beck and others, may be necessary. When the process is of purely dental origin, and is accompanied by caries of the teeth or alveolus, it may be necessary to operate through this region, and the liability of reinfection through the mouth and the difficulty in securing full relief by this method may later call for one of the types previously mentioned.

If possible, operations should be avoided during the presence of an acute process involving the sinus, much more satisfactory results being obtained when the patient is free from the acute conditions which accompany infection.

Much of the text of this paper describing various types of operations, have been taken from H. W. Loeb's "Operative Surgery of the Nose, Throat, and Ear" (Volume 2).

The most simple type of operation is puncture through the nasal wall, followed by irrigation. The inferior meatus offers the best location for such a puncture because of the thinness of the bone, greater ease of introduction of the needle, and the fact that the needle enters near the more dependent portion of the sinus. This operation is done after making an application of cocain to the nasal mucous membrane. Fein's or Lichtwitz's needle, or a trocar of the Pierce, Fletcher or Killian type may be employed. Irrigation with a weak solution of potassium permanganate frequently repeated may cure the suppurative process. Fatality following this operation occurs with sufficient frequency to justify some concern in its performance, while distressing and disquieting symptoms are quite common. This operation is chiefly of value in acute cases and should be accompanied by the removal of the pathologic dental and nasal conditions.

When such a simple method fails, resection of a part of the nasal wall may be attempted. In all nasal operations for the relief of maxillary suppuration, if local anesthesia is depended on, thorough cocainization should be employed. A 10 per cent solution of cocain and epinephrin should be applied on cotton for at least ten minutes, and from time to time during the course of the operation further applications may be necessary. Submucous injections of a procain solution are called for in some of the longer and more extensive operations.

Mikulicz deserves the credit of first resecting a part of the nasal wall through the inferior meatus. This may be accomplished with or without the resection of a part of the inferior turbinate. If the meatus is small, it is better to resect

in order to provide more adequate drainage. A sharp instrument of the type of Mikulicz's or Wilhelmenski's trocar is thrust through the nasal wall into the antrum. The opening thus made is enlarged by large hand burs or forceps of the Wagner, Yankauer or Fletcher type. Chisels may also be employed, as well as an electric engine fitted with proper handpieces. The operation just described may be extended so as to include a portion of the middle meatus. It involves resection of the inferior turbinate, perforation through the nasal wall and enlarging the opening by taking away with chisel, bur or forceps whatever portion of the nasal wall in the middle and inferior meatus is desired.

Dahmer improved this operation by using a flap of the nasal mucosa to cover the floor of the maxillary sinus, of which the mucosa had been curetted away.

Canfield, by resecting the naso-antral wall and extending the opening so as to include the antero-inferior angle of the apertura pyriformis, devised an operation that permits a direct view from the nose into the maxillary sinus and a greater curettement of the mucosa than in other nasal operations. After a most thorough cocainization, unless a general anesthetic is used, an incision is made anterior to the inferior turbinate down to the bone. The periosteum and soft parts are elevated by use of the Freer submucous elevator, care being taken not to carry the instrument too far below where it might injure the infraorbital nerve. The mucous membrane and periosteum are then elevated from the naso-antral wall of the inferior meatus, care being taken to avoid tearing them. The sinus is opened with a chisel or trephin at the antero-inferior angle of the apertura pyriformis, the opening being enlarged externally for some distance on the facial surface of the maxilla. The nasal wall of the sinus is then removed with chisel, forceps or dental bur, as far back as possible, the nasal mucosa being carefully preserved. The entire maxillary mucosa is removed with curets. The nasal flap of mucous membrane is placed along the floor of the sinus, gauze packing being used to retain it in position. The operation may be performed without using this flap.

Skillern has modified the Canfield operation by making it less extensive and somewhat easier to perform.

The operations just described practically cover those employed through the nose in affecting drainage of the maxillary sinus. Usually, unless the disease has existed for a long time, these operations are followed by resolution. Unpleasant sequelae which may follow should be mentioned: 1. The swelling and inflammatory reaction following the more extensive operation is usually very great. 2. Injury to the duct may cause a stenosis. 3. Resection of some of the dental nerves may cause numbness in the region of the upper incisor teeth. 4. Excessive granulation of the antral cavity may follow removal of the entire mucosa of the sinuses. 5. Secretion and exudate in the antrum which have accumulated may suddenly pour out of the nose when the patient leans his head forward. 6. Crust formation is very common.

The oral type of operation commends itself on account of the accessibility. The opening through the alveolus was for many years the only operation performed for maxillary sinus empyema. Unfortunately, reinfection through the mouth in this type of operation is very common. Sometimes the opening was so small that it would close before resolution in the sinus had taken place, and in such cases obturators were necessary to keep it patent. Frequently, resolution took place, the opening in the mouth persisted, and it sometimes was impossible to close the opening. On this account, this type of operation should be performed only to relieve symptoms,

pending the performance of a more satisfactory operation.

Küster, in 1889, established the plan of opening the sinus through the cuspid fossa. A horizontal incision is made through the mucosa and periosteum above the alveolus running through the cuspid fossa at the gingivolabial fold. After elevation of the periosteum, the sinus is entered through the fossa by bur or chisel, the opening being enlarged as much as desired. Treatment is carried out through the mouth, and it is necessary to use some type of obstruction to keep the opening closed during the intervals. This operation is not satisfactory as an ultimate cure.

Caldwell undertook to overcome the uncomfortable character of the postoperative treatment of the Küster operation by combining the operation with the resection of the nasal wall of the sinus, through which the after-treatment was conducted, the one in the mouth being sutured. About a year after Caldwell described his operation, Luc quite independently described a similar operation, and the operation is now known as the Caldwell-Luc. There have been modifications, but in the main the usual plan pursued is to open the sinus through its facial surface, to curet the sinus wall extensively, and to resect the nasal wall at the inferior meatus with or without resection of the inferior turbinate. An important modification, which is now quite generally used, consists in forming a flap of the nasal mucosa and covering the floor of the antrum with it. This operation is best performed under general anesthesia, although it is possible with thorough cocainization and the use of submucous injections of procain. The incision is made at the line of union of the upper labial and gingival mucous membrane from the lateral incisor region to the first molar. The periosteum is elevated from the greater portion of the facial surface of the maxilla, and the sinus is opened in the cuspid fossa with chisel, bur or bone forceps to as wide an extent as desired. The entire sinus mucosa is curetted away, and if roots of teeth are found to perforate in to the sinus, they are resected or the teeth are removed. The inferior turbinate is resected in part or left intact, and the nasal wall is then removed by appropriate forceps or burs, or it may be resected through the sinus cavity. When the flap method is employed, care should be taken not to injure the nasal mucosa. The flap is reflected on the floor of the sinus; gauze packing is introduced into the sinus and passed into the nose through the opening made, and the mucous membrane of the facial surface is sutured. In some cases, in addition to the resection of the inferior turbinate, it may be necessary to resect the anterior end of the middle turbinate.

Denker's operation provides a much better postoperative view into the sinus, making dressing much easier. This operation provides for the resection of the facial wall of the sinus and the removal of the bridge of bone between this opening and the apertura pyriformis. The operative procedure is practically identical with the Caldwell-Luc, except that the removal of the facial wall is continued so as to include the infero-external angle of the crista pyriformis.

When the previous operations are unsuccessful, certain cases must be subjected to a more radical treatment. Beck removes the entire facial wall, as well as the lateral wall under the malar bone as far as the zygomatic fossa, resects the infraorbital nerve both in the foramen and in the canal, curets thoroughly the entire mucosa, and removes with a bur the underlying superficial layer of bone so that prolific granulations may form. The wound is dressed entirely through the nose, the mouth incision being completely closed.

The infraorbital nerve is resected,

because, if it is allowed to remain, it will probably be caught in the cicatrix, causing great pain to the patient.

Partsch's operation is used in those cases of bilateral maxillary empyema in which the prospect of recovery by means of other operations is not promising. A wide incision is made at the gingivolabial fold on both sides, and the maxillary bone on both sides of the septum nasi is cut through with a chisel just above the alveolus. The lower fragment is pulled downward, the inferior turbinates are resected and the naso-antral wall is removed. The antral mucosa is cleared of the pathologic process by sharp curets, and the sinus is dressed with gauze, which is carried by way of the nasal cavity through the anterior nares. The fragments are pulled together and the soft parts sutured.

In connection with the after-treatment in the major operations described, it is usually found to be safest to leave the gauze tampons in place for three or four days, particularly when nasal flaps are used, to permit the flap to become attached to the antral floor. Saturating gauze in tincture of benzoin usually prevents it from becoming foul-smelling. Subsequent to the removal of the gauze, the after-treatment resolves itself into irrigation from time to time through the nose.

The time consumed in discussing the operations to relieve empyema of the antrum leaves little time to go into a discussion of other affections of this cavity. I have gone into detail in this regard for the reason that this disease is so very common that it overshadows all other affections of this cavity.

One should not close a discussion of the surgery of the antrum, however, without mentioning the other surgical diseases. Malignancy of the antrum is treated as malignancy in other parts of the body. Complete removal surgically of the affected parts with the accompanying removal of neighboring glands is indicated in such conditions. Following this, radium and deep roentgen-ray therapy should be employed as an aid in reaching affected parts that escaped the knife.

Large polypi which originate within the antrum or which may extend from the nasal cavity by perforating through the nasal-antral wall must be removed. A selection of one or the other operations previously outlined will aid in effecting the removal by offering proper accessibility to the affected area.

Cysts which have their origin from within the antrum itself (mucous cysts) and cysts which originate externally to the antrum, but by their increase in size produce pressure on the antral wall, compressing the cavity and sometimes perforating into the cavity itself, must be dealt with surgically in such a manner as to effect their complete removal. The walls of the cysts must be completely removed and a proper after-treatment instituted in order to cause formation of healthy tissue in the area involved.

Care must be taken in diagnosing cases when all signs point to empyema of the sinus but repeated examination shows an absence of pus in this cavity. Usually, these cases prove to be infected cysts which have impinged on the antral cavity, but which can be differentiated by proper roentgenographic examination.

Finally, surgical intervention through the sinus is necessary in cases of foreign body in the antrum. These include pieces of broken roots of teeth which are forced into the antrum during the process of removal, and other foreign bodies which are introduced into the antrum by accidental means. Their removal is effected by the use of some type of operation previously described which will give proper accessibility. In cases in which broken roots of teeth are pushed into the antrum, the enlargement of the socket may be necessary so that proper

irrigation and proper instruments may be introduced to bring about the desired results.

Discussion

Theodore Blum, New York City: No one has the moral right to deal with any part of the body unless he is trained to do so. I do not believe that a practitioner, whether medical or dental, has a moral right to treat conditions of the antrum unless he has been specially trained to do so. The dentist surely has no right to treat any condition of the antrum unless it is caused by some dental or maxillary infection.

I will take the liberty to read from a paper on "The Oral Surgeon's Position in Diseases of the Maxillary Sinus," read in 1921: "Dentists as well as oral surgeons, unless they also specialize in nose and throat work, will save themselves a lot of annoyance by treating only infections of the maxillary sinus of dental origin; otherwise, they may drain a sinus for months while it is continuously reinfected through the nose or adjacent sinuses."

One point that Dr. Loeb has not mentioned is the question of percentage of infection from the nose and through the teeth or the maxillary. Hyick, in his work on disease of the antrum and adjacent sinuses, points out that the largest majority of sinus infections are caused by influenza; as far as my experience goes, I would say that only a small percentage, or at least the smaller percentage, of antrum diseases are caused by dental or maxillary conditions and the majority of cases by infections through the nose or adjacent sinuses.

You often hear the statement that cysts of the maxillary break into the antrum. In my experience, I have known of one case in which there was an acute condition developing into a cyst and the pus broke through a point of least resistance, which, in this case, was the antrum. However, if operations are performed on cysts without the clear view of the field of operation, it is quite likely the operator will break into the antrum or into the nose, because the bony wall which lies between the cyst and the antrum has been reduced to a membrane wall and is therefore very readily penetrated.

You also often heard mentioned as a symptom of antrum disease a swelling of the apex of the cheek. The cheek will never be swollen or red unless the bone or periosteum has been primarily involved and diseased, when the mucous membrane of the mouth will also be swollen and red. Secondary involvement of the bone is extremely rare. Chronic distention, apparently of the antrum walls, but in reality of the outer plate of the maxilla, in the region of the alveolus, buccally as well as of the palatal plate palatally, is due to the formation of dental cysts. They rarely develop within the antrum. In the author's case of this type, the cysts membrane was entirely surrounded by a bony wall. Only in neoplasms is there a true dilatation or distention of the antrum walls. In acute cases, chills and fever are present.

One must always keep in mind that the maxillary sinus may contain pus without being actually diseased. In these cases, the antrum is a reservoir wherein the secretions of a diseased frontal sinus most often accumulate. Cysts of the maxilla, particularly the ones in the molar regions, may give the impression of an empyema, especially if the bony wall that usually separates the cyst and antrum has disappeared and only a membranous wall exists. In these cases, pus may discharge from an oral fistula when the patient's nostrils are held closed and the patient is asked to blow through the nose. However, on irrigation, pus will appear through the fistula, but none through the nose; nor will there be a history of discharge from the nose or throat, unless nasal disease is present or the antrum is simultaneously affected.

The treatment of all acute cases—and this is one of the points that Dr. Loeb made in his paper—is, from the standpoint of the rhinologist, expectant, in other words, by irrigation. Only the dental cases form an exception, as a tooth may have to be extracted, a periosteal abscess incised, a sequestrum removed or a foreign body taken out. The removal of a root should always be attempted through the socket from which it came by enlarging the socket as outlined before and attempting to locate the same by inspection or with an instrument. If this is not successful, irrigation is the next step. During irrigation, the root at times appears through the nose when the ostium is large and the root itself small. Should this method not succeed, the mucoperiosteal flap, with removal of the outer antrum wall, must be resorted to. In either case, if the antrum is healthy, a piece of iodoform gauze placed over the wound and held in position by a figure 8 wire encourages the quick closure of the opening. If, during the operation the antrum membrane is exposed but not pierced, no further treatment is necessary. Should the membrane be pierced and the antrum opened into, it must be irrigated at the time of the operation if there is a possibility of débris entering the antrum. If dressing of the wound is indicated, the iodoform gauze must not be placed in the antrum but just so that it will cover the opening. In all these cases, the patient should be warned not to blow the nose for cleansing purposes,

but only to wipe the nose, so as not to disturb the blood clot and gauze.

Antrum disease or infection of the bone proper is very important. Cystoma originating from the antrum wall very often and especially in the earlier stages shows a swelling either of the palatal side of the antrum or of the buccal side of the maxilla. There is no redness, no inflammation present, but if you use your two index fingers you will find a marked suggestion of fluctuation. The roentgen-ray examination and the nasal examination will of course give the diagnosis, but it is important not to mistake these conditions because any interference with malignant tumor by curettement only makes the tumor more malignant and encourages spreading.

It is quite difficult at times to establish the fact that some dental or maxillary condition is the cause of the inflammation of the antrum. But even if this is established, it will be necessary to have all the sinuses examined by means of the roentgen-ray and have the nose, throat and sinuses thoroughly gone over by a rhinologist. If other sinuses, especially of the same side, are affected, an operation by both the rhinologist and the oral surgeon will be indicated. Acute and emergency cases are the exception. An inflammation of the maxillary sinus not of dental origin is a case for the rhinologist and not the oral surgeon. The patient's welfare must always be uppermost in our minds. It is unfortunate that some antrum cases must be treated through the mouth. The natural opening of the maxillary sinus leads into the nose and the logical treatment, therefore, should be through the nose. It would be absurd, on the other hand, if an empyema of dental origin were treated through the nose when the tooth or root must be removed and the sinus, therefore, can conveniently be drained through the socket without disturbing normal relations in the nose. While the rhinologist and oral surgeons can serve patients best in their own field, the careful cooperation of the two can only be of additional benefit to them.

William A. Spring, New York City: What shall the dentists do in the case of a badly infected tooth that has caused disease of the bone, if, when he removes the tooth, he knows there is an abscess that is likely to lead to future trouble? I am not an oral surgeon: I am a general practitioner. It has been my custom to curet, and I wonder if I would be doing my full duty if I avoided it, if I knew there was diseased bone between the end of the root and the antrum. I ask this because of the advice given by Dr. Loeb. My method has been to remove all bone that is diseased, and if the antrum is exposed, to irrigate for some time.

M. R. Howard, Denver, Colo.: Dr. Loeb suggests that infection follows the curettement of teeth in molars and bicuspids. This statement without being qualified would be misleading and tend to discredit the value of curettement.

In some cases curets or other instruments used improperly or with too much pressure would force infection into the antral cavity. But it does not hold true that curets should not be used in the sockets of bicuspids or molars, for unless this curetting is done at the apices of the teeth, many more antrum infections will result.

Care should be exercised in the use of the curet or any other instrument in the region of the antrum, so that undue pressure may be avoided. This is done best by using the pen grip on the handle of the instrument.

Another point: Should the apex of a pulpless tooth extend into an infected antrum, the tooth should be removed and not subject the antrum to the possible danger of after-infection. From reports of other operators and in my own hands, the intraoral antrum operation has been a success in the majority of cases. It may be done without the danger of infection from the mouths. It does not interfere with the normal functions of the nose or with breathing, as is apt to occur in extensive operations through the nose.

A. T. Rasmussen, La Crosse, Wis.: In every case in which maxillary sinusitis of a chronic nature is present, a careful examination should be made of all of the intramural or accessory sinuses. How many cases have we not seen that have been under treatment for months or years, irrigation or operation on the maxillary sinus, when the real cause of the trouble was in the frontal or ethmoidal sinuses. Those of you who attended the Section last year, in Los Angeles, will remember some lantern slides that I showed in which the frontal sinus drained directly into the maxillary sinus. How futile it would be to treat the maxillary sinus in such a case, if the source of the trouble was in the frontal. That is one of the reasons why so many of these patients do not recover, even after operations have been performed which should prove successful.

Surgeons do not all agree upon the route for entering the maxillary sinus. Nor do we all agree on the best method of draining that cavity. It is an undisputed fact that draining of a liquid, from any vessel or cavity, is best accomplished by placing the drain at its most dependent portion, thus employing the force of gravity in emptying the cavity of its contents. However, it has frequently been said, and I believe Dr. Loeb said, "The best place to drain the maxillary sinus is not at its lowest point." I would like to be shown the reason why. After twenty years of close study

and clinical observation, I am still of the opinion and firmly believe that the best place to drain the maxillary sinus is at its lowest point.

This may not be possible in every case without sacrificing structures which should not be removed. In those cases, the ideal should be approached as nearly as possible. However, the skilful oral surgeon will usually be able to accomplish this without sacrificing teeth or other normal structures. I am not advocating the removal of teeth for the purpose of establishing drainage.

Dr. Loeb calls attention to the advisability of puncturing the sinus at its lowest point, in making exploratory operations, or for the purpose of irrigation. Why it is so important to puncture the sinus at its most dependent portion for the purpose of exploring, or merely for irrigation, if it is not the best place to enter for the purpose of draining. It seems to me that there is a contradiction here. We should try to be rational in our procedures and not attempt to justify them by mere convenience.

Dr. Loeb stated that the method of operating through the anterior wall of the maxillary sinus is not a success, so far as ultimate cure is concerned. My experience with chronic maxillary sinusitis, extending over a period of twenty years, does not justify such an opinion. It has been my good fortune to be able to clear up many of these cases in which operation had been performed through the nasal wall. I realize that in some cases almost any type of operation that will allow the escape of the pus will result in a cure; also that the thoroughness and skill with which any type of operation is performed has much to do with its ultimate success or failure. However, I feel that I can accomplish much better results when I am able to see and approach the entire field of operation with as little difficulty as possible. This I can accomplish best through the anterior wall of the sinus, and in so doing I destroy less tissue than by employing any other route. No important structures need be sacrificed. The opening to the sinus will close. A large opening through the nasal wall remains open permanently. If the operation is skilfully done and the case watched, the patient will get well.

Once again, let me say that I believe the most rational operation on the maxillary sinus is through its anterior wall. Barring malignancy, syphilis and the involvement of other sinuses, these patients will get well and all structures will be as nearly normal as it is possible to have them.

E. C. Fox, Detroit, Mich.: In a series of fifty-four cases of fracture, four were accompanied by fracture of the maxillary, one by fracture of both the maxillary of the right and that of the left side. In these four cases, there was a definite empyema of the antrum. One of the patients is still in the hospital with a drainage just below the orbit where the bone was fractured. Whether or not this condition was there before the fracture or not is not known.

The patients give no history of that condition, but I think fracture has something to do with conditions of the antrum and should be followed up as these cases have been.

Truman W. Brophy, Chicago, Ill.: The question of the antrum and its diseases is an immense one, and we must remember that often the initial lesion is not within the antrum. I believe that 75 per cent of all infections of the antrum come from dental abscesses. We know that many cases of infection of the antrum come from the nasal membranes and also from the frontal sinus.

I have a case of empyema of the antrum under treatment at the present time, the origin of which was in the frontal sinus. Direct communication between the frontal sinus and the antrum occurred in 56 per cent of specimens examined by Shafer. I have been trained to believe, and I have always tried to practice according to this rule: "A disease that is amenable to successful treatment should be treated and eliminated." Normal tissue which has important functions should not be removed.

Now, what is the history of infections of the antrum of dental origin? The infection may come from a dental abscess. Dental abscesses are amenable to successful treatment in a large majority of cases. Sometimes, the only recourse is to extract the tooth or teeth, but these cases are not frequent. Diseased teeth usually can be restored to health and usefulness, and when they can be restored, it should be done. When we have an abscess of the antrum, of dental origin, possibly at the apex of a bicuspid root, is it right to remove the tooth? A general statement that has unfortunately been made is that teeth that have dental abscesses are dead; that pulpless teeth are dead. There never was a greater error. There never was a statement more misleading.

I am a medical man myself. I taught in a medical college for twenty-six years, but you will find today there is no instruction in the medical colleges on dental pathology. Show me the catalogues or the announcements of the medical schools of this country and point out, if you can, any part in a catalogue that provides for adequate teaching of dental pathology and oral diseases. You cannot do it. That being the case, the medical man naturally appeals to the textbook for a knowledge of the diseases that have been the cause of

infection of the antrum. The dentist says that a tooth is dead. The physician says, "Eliminate everything that is dead"—and he is right. But you do not see many *dead* teeth. You see teeth that are pulpless, but they are not necrotic. The pericementum usually lives. You have, therefore, vital relations between the tooth and surrounding tissues. The tooth is not dead.

The statement was made that if the tooth punctures the floor of the antrum, possibly the pus passes through into the antrum. If this happens, follow the instructions that were given: Get at the seat of the disease. Remove the diseased tissue, but not necessarily the tooth. Sterilize the tooth root. Fill it well. When you have relieved the tooth from disease, make an opening through the cuspid fossa, treat the antrum and eliminate the disease of the membrane; cure your patient, and he will still have his teeth.

Herman Amden, Cleveland, Ohio: The first antrum case in which I ever operated was in 1873, and I received a fee of $20. I have had a few cases since that day and I have never yet seen one in which I considered it necessary to open through the nares.

Claire L. Straith, Detroit, Mich.: My own conviction is that the sooner the antrum is closed off from the oral cavity the sooner it will be healed. We have had numbers of cases under treatment in which a tooth has been extracted and the socket drilled into the antrum and the cavity has been packed with gauze such as was described by the author. The cavity has been irrigated and then packed with gauze in some cases almost daily, for months, and the patients did not get well. As soon, however, as this opening into the antrum was closed, they often recovered under treatment by simple irrigation. I believe that is a fact worth considering.

In regard to the possibility of these abscessed teeth affecting or causing the infection of the antrum, I believe that this is possible. Many nose and throat specialists are beginning to believe that many of their antrum cases can be cleared up by careful examination of the teeth. When abscesses are found at the apices, a flap operation is performed, the mucous membrane and periosteum being reflected and the granuloma dissected off the floor of the antrum. This stops the continual drainage of pus into the antrum and the condition usually clears up by simple drainage through the nose.

I think that the nose and throat men can get a great deal of information from dentists in this matter and if they work hand in hand, such cases can be cleared up much more quickly. However, I wish to repeat that, in my opinion, the operation of drilling through a tooth socket to wash out the antrum is bad practice.

J. M. Jones, Columbus, Ohio: I have been attending these sessions for a great many years, and the question always arises as to just where the rhinologist and the oral surgeon differ and as to where they overlap. I frequently see skilled abdominal surgeons perform antrum operations, and they do about as well as one of our laboratory men could in an abdominal operation. Now, if dental educators think the general profession is not capable of doing this work as well as the abdominal surgeon, it is up to the dental profession to educate the dentists as to how to do it right.

Frederick Molt, Chicago, Ill.: I have waited to hear a word of warning voiced about indiscriminate irrigation in antrum cases. There seems to be a tendency, unfortunately, the moment an antrum is punctured, to rush to irrigate; in other words, if a dentist, in operating, unintentionally opens the antrum, he seems to feel that it is incumbent on him to wash it out. Quite the contrary. It should be emphasized that, with the ostium occluded, as it so frequently is by hypertrophied tissue, the swelling of the turbinal bodies or the deflection of the septum, any drainage there may be in the case of an infection is distally. Forcing an irrigating solution, frequently of dubious sterility, through the opening from the mouth will in many cases carry a purulent or mucopurulent content backward into the pharynx with the distinct possibility of infecting not only the ethmoids but the sphenoid sinus as well. With an infection of the entire paranasal tract, the maxillary sinus trouble is of less significance.

It should be pointed out, therefore, that if, in the course of extraction, the antrum is punctured with but little likelihood of any infected tissue or root fragment having been carried through, there should be no packing, irrigating or any other interference. If root fragments have been forced into the antrum, they should be recovered by a flap operation and the antrum permitted to heal. If, however, there is found to be a purulent or polypoid involvement of the sinus, it may be necessary to proceed with a radical antrum operation.

The point should never be lost sight of that the maxillary sinus is part of the sinus tract, not an individual and isolated structure, and that a pansinusitis, with its painful and dangerous sequelae, may readily develop from careless operative interference.

Adolph Berger, New York City: A good deal has been said about the immediate closing of the antrum and about the dangers of

infection when the maxillary sinus is opened through the oral cavity. There is probably, considerable justice in those statements. It is logical to assume that when a presumably clean cavity, such as the maxillary sinus, becomes connected with the oral cavity, which is constantly infected, it also becomes infected. The clinical findings, however, do not always bear out such an assumption.

We find that a great many antrums, when inadvertantly opened in the removal of healthy teeth close up without complications, and without treatment. The explanation, in part at least, is this: In those cases in which there is a preexisting infection about the tooth or in the sinus, suppuration follows upon opening, and we then jump to the conclusion that the sinus has become infected because it was opened through the oral cavity.

It is very important to recognize these conditions in the treatment of the cases. I cannot agree with the statement that the sooner you close up the oral opening the better. Determine first whether or not there is infection within the antrum or in the tissues surrounding the tooth removed; and if this has been cleared up, it is then advisable to permit closing or to close the opening.

Dr. Loeb has illustrated a number of what we call classic operations. I feel that a number of these ought to be put into the discard. As is the case with some of our old literature, there is nothing to recommend them, excepting that they are classic. In other words, we might learn from some of them that they should not be performed. You will find that most recent books comment on the fact that efforts are being made to depart from some of the mutilating operations on the maxillary sinus that have been practiced in the past.

Those of you who have seen some of these cases in consultation or have treated them know how intense the suffering is following some operations. I will grant that in many instances the empyema or the pus discharge does clear up, but the sequel of the operation is often more grievous than the original condition was.

Despite the fact that most men favor opening into the sinus through the cuspid fossa, this is not always the point of vantage, and there is a danger of injuring some of the teeth within the area. While some men speak lightly about the removal of one or two teeth, sometimes perfectly good teeth, this is quite a serious matter when viewed from the patient's standpoint. Is there a way of getting into the maxillary sinus without extracting or mutilating any of the teeth, as is sometimes unavoidable when entering through the cuspid fossa? I have found that by opening through the base of the malar process of the maxillary bone and above the apices of the second bicuspid and first molar teeth, we obtain a clear view of almost every part of the sinus, and that the mutilation is much less than when opening through the cuspid fossa.

V. H. Kazanjian, Boston, Mass.: I am pleased that the speaker does not approve of the aveolar route for maxillary sinus operations. There have always been discussions between rhinologists and dentists as to the best way to drain antrums. The study of the pathology of acute and chronic sinusitis should help us to clear this point.

In a case of acute sinusitis caused by tooth infection the antrum acts as a mere reservoir for pus; the mucosa does not undergo any appreciable change. Under these circumstances, the most natural procedure would be to extract the offending tooth, remove the necrotic bone, and allow the pus to drain through the tooth socket. It is not necessary to keep the tooth socket open for drainage very long. Once the cause of trouble is removed, a quick recovery will probably ensue. This is the only condition in which drainage from the aveolus seems to be indicated. However, in chronic sinus infection, whether caused by tooth infection or not, we find not only pus but also degenerative changes of the mucosa in the form of polypoid growths. Frequent drainage and irrigation, whether through aveolus or nose, will not bring permanent relief to the patient. It is, therefore, a useless procedure for the dentist to keep on irrigating the antrum through the aveolar socket for a long period of time. Radical antrum operations only promise cure in chronic sinusitis.

Dr. Loeb (closing): I am glad that the discussion has brought out different opinions. However, I believe that some of the expressions made this morning were made with the idea in mind that a dentist should hesitate to refer the treatment of any part of the oral cavity to a specialist in some other branch of medicine. There are many conditions about the oral cavity which neither the dentist nor the oral surgeon is so competent to handle as a specialist in some other line, and we must not forget that simply because the antrum becomes infected from a tooth the treatment of this cavity is necessarily always within the province of the stomatologist.

I shall try to answer all the questions that were asked. As to the treatment in one section of the country differing from that in another, I may say that perhaps the cases which we see in our locality are those in which operation has been performed in other sections and as the operations peculiar to that

section were unsuccessful, the patients drifted out to our part of the country.

Dr. Blum mentioned that there were a number of infections due to probing. I am very grateful to him for bringing this point out. I stated that infection of the antrum occurred frequently after the removal of a tooth, but I did not stress the point made by him, and which I wish to emphasize now; namely, that many of the infections of the antral cavity of dental origin are not those which existed about the apices of the roots of a tooth, but are those which were introduced into the antrum by probing into the socket of a tooth immediately after extraction in order to see whether or not it communicated with the antrum. If such cases were allowed to rest after tooth removal, Nature would take care of most of them. Frequently, a dentist after removing a tooth will probe the socket, and if communication did not exist before, it will exist after he has finished probing.

The question was asked as to what should be done if necrotic bone were found in the neighborhood of the apices of the roots of molar teeth, and whether or not it should be let alone or curetted out. If the sequestrum is large enough to be felt, it should be removed, but if the bone is simply softened, I believe that no attempt should be made to do anything at the time, and Nature should be given a chance to cure the affected area. Drainage will be established through the socket of the tooth, and this is often sufficient.

Dr. Brophy said that 75 per cent of the cases of empyema of the antrum were due to infection from dental abscesses. I believe that 75 per cent of the cases of empyema of the antrum are of nasal rather than dental origin. Of those of dental origin, I think one would be correct in saying that many are due to dental abscesses.

I attempted to present this subject from a stomatologic and not from a rhinologic point of view, though I am convinced that the treatment of empyema of the antrum, particularly in those cases in which no communication exists into the oral cavity, is more in the province of the rhinologist than in that of the stomatologist. The dentist must understand that there are frequently diseases about the oral cavity which can be more successfully treated by someone else.

I did make the statement that when roots of teeth were found to penetrate into the antrum during the process of certain types of operations the roots may be resected or the tooth removed and I thank Dr. Brophy for answering the question relative to this for me. I see no reason why a tooth whether it is devitalized or not should be removed if a part of that tooth can be successfully removed and the same results obtained.

Someone mentioned that in many cases of chronic empyema we must be careful to determine just which sinus is affected. There have been many cases of antral infection treated unsuccessfully because the primary cause was in some other of the accessory nasal sinuses. There are four groups of sinuses that communicate with the nasal cavity—the maxillary, the frontal the sphenoid and the ethmoid sinuses. These are all lined by mucous membrane which is a continuation of the mucous membrane lining the nasal cavity. The most careful examination must be undertaken in order to exclude the other accessory sinuses when pus is found in the nasal cavity. The original source of infection must be relieved, as, otherwise, no matter what treatment is used, whether it be the so-called classic operations or whether it be an operation adapted to some particular section of the country, the patient will not be permanently cured.

One member mentioned that he had never seen a patient having antral infection which did not get well by an operation through the mouth, but he also stated that the first case he ever saw was in 1873 and that he had seen only a few cases since that time.

Another spoke of the fact that patients do not get well by repeated packing. This is very true. Dentists are too prone to pack and repack cavities of the mouth, thinking that they are obtaining drainage at the same time. There is quite a difference between a drain and a pack. Gauze packing becomes very foul and easily causes reinfection.

Dr. Berger stated the classic operations should be put into the discard. I do not believe that he would discourage the use of the Canfield operation and others, since the most of us know of the success which the rhinologist has in draining the antrum into the nasal cavity.

To my mind, the reason that the nose is the proper cavity into which the antrum should be drained is because so few patients suffer any after-effect. Pain can be easily controlled, the after-treatment is not difficult, and a permanent opening is established which will readily take care of any future reinfections.

In regard to operating at the lowest point of the antrum, if this were done operations would always have to be made through the alveolar process. The advantage of operating through the inferior meatus is twofold: (1) the part of the antrum which adjoins this area is almost as low as the lowest portion; and (2) the naso-antral wall in this area is very thin and can easily be removed.

DIAGNOSIS AND CORRECTION OF TRAUMATIC OCCLUSION: THE RELATION OF INDIFFERENTLY EXECUTED RESTORATIONS TO THIS CONDITION

By FREDERICK A. BRICKER, D.D.S., Hollywood, California

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

TRAUMATIC occlusion, although a comparatively new subject, is beginning to come into its own, and, as is frequently the case in the introduction of a new theory, the profession is divided by a difference of opinion concerning the phenomena involved. Much of this difference of opinion is, I believe, due to a failure to recognize the definite symptoms of traumatic occlusion. It is, therefore, my hope that a consideration of the symptoms that warrant a diagnosis of this condition, and of the possibilities and methods of correction, will clear away these supposed obscurities and help us to unite on a common basis and reach more complete understanding of this subject.

Normal occlusion (Figs. 1, 2 and 6*a*) may be defined as an innocuous distribution of stress on the teeth in their various contacts. Traumatic occlusion (Figs. 3*a*, 4*b* and 5*a*) may be defined as an abnormal occlusal stress which is capable of producing, or has produced, an injury to the periodontium (Stillman and McCall).

Normal Lines of Force

I believe the normal lines of force on the teeth are frequently misunderstood. It is the excess lateral and mesiodistal stress, and not the vertical stress, which produces the greatest percentage of traumatic occlusion. In a great number of instances, Nature, to a certain degree, compensates for excess vertical stress by increasing the alveolar support. We see many cases in which two abutment teeth are carrying the stress of four, and yet the abutment teeth remain as firm as any in the arch, if the line of stress is vertical. Many cases in which patients are presented for extraction of the teeth, cases in which only a few teeth remain in the arch in opposing positions, and in which the tissues are so firmly attached that modern surgical procedures are required for removal of the teeth, further illustrate Nature's efforts at compensation.

Traumatic Occlusion

Traumatic occlusion is the most common cause of interference with circulation in the periodontal tissues, with consequent lowered resistance of this area, pocket formations, absorption of the alveolar crest and, finally, resorption of the alveolar process. With these combined factors, bacterial invasion follows. Evidence of this condition is change of color in the marginal gingiva, extending toward the root of the traumatized area. Failure to appreciate the importance of this change of color as an indication of interference with circulation accounts for the large number of cases which remain

unrecognized until the later stage, in which tenderness is complained of, a stage in which treatment is much more difficult and less effective. This change of color is also found under dentures when trauma is produced by improper incoordination of cusps. In cases in which a full denture is worn above and only the six anterior teeth remain below, the trauma produces resorption of the anterior alveolar ridge.

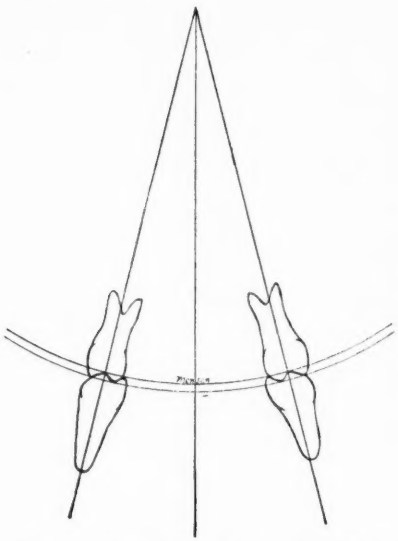


Fig. 1.—Cross-section of the arch with the teeth in normal occlusion, vertical stress being applied or stress being applied on the long axis of the teeth.

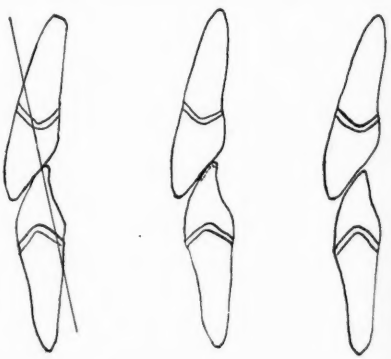
Restorations

In our attempt to gratify the demand for hygienic and esthetic restorations, the use of highly alloyed golds has become almost universal. This practice has aroused considerable criticism and controversy within the profession, and while the use of these golds has undoubtedly been a serious factor in the increase of periodontal disease, I do not believe the fault lies so much with the golds as with indifference to tooth forms and occlusion exhibited by so many operators in this field.

In the process of setting a bridge, we

Fig. 2.—Correct relationship of the six anterior teeth in central occlusion.

use the mallet in getting the restoration into place, thereby forcing the tooth into the socket and compressing the membrane sufficiently to take it, temporarily, out of occlusion. If the dentist will make an examination within a day or two, he will



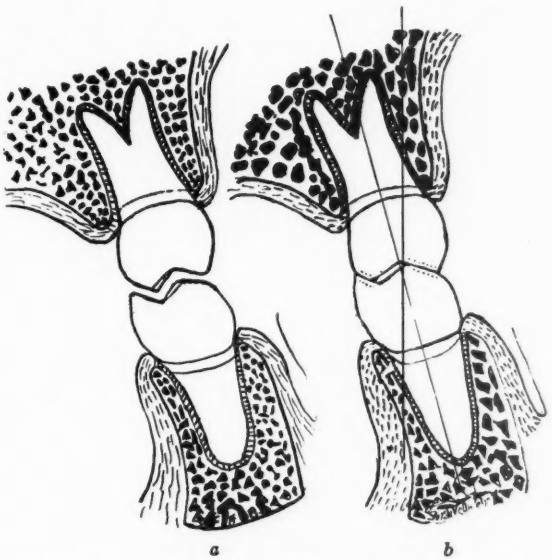
a *b* *c*

Fig. 3.—*a*, the incorrect relationship often found on one or all of the anterior teeth, producing traumatic occlusion; *b*, the surface to be relieved by grinding (indicated by dotted lines); *c*, corrected occlusion.

find the tooth again in its normal position and the occlusion in excess. It is advisable to make this later examination, to detect any excess occlusion so that it may be corrected. The detection of such a condition may be facilitated by the use of a disclosing paste, which I will describe later.

It is not enough that we be skilful prosthetists, but, lest our restorations belie the name, we must give special attention to correcting the stress directed on them. No matter how artistically the restoration may be completed, the result will be a success only so far as it is complete in these essentials. Moreover, as the trend of the coming generation is toward a frailer alveolar support, more consideration of occlusal stress in placing restorations will be necessary.

I doubt that there is anyone in this audience who is not meeting with difficulties in this phase of his practice. Because golds of high alloy do not flow under stress as do the softer golds, a tooth that occludes with another which has been restored with high alloyed gold will not wear to the same extent that it would if both occluding surfaces were of enamel. In such cases, it is necessary to make frequent examinations in order to maintain normal occlusion.



a *b*

Fig. 4.—*a*, the surfaces that receive the greatest amount of wear during mastication; the lingual occlusal plane of the upper molars and bicuspids and the buccal occlusal plane of the lower molars and bicuspids; *b*, the line of stress after this condition has developed.

Direction of Stress in Occlusion and Mastication

The greater the vertical stress on the root in proportion to the anteroposterior and the lateral stress, the greater the probability that the teeth and their investment tissues can withstand the stress placed on them in occlusion and masti-

cation, and the longer their term of usefulness.

"In the act of swallowing saliva, the teeth are in central occlusion, and a positive pressure of from 5 to 15 pounds is exerted upon the occlusal surfaces" (Monson.)

It will be found that, in eating hard substances, the jaws are moved laterally until the teeth are in a position to exert the greatest stress. This is an unconscious act, in which the stress is placed as nearly as possible in line with the long axis of the teeth.

During deglutition, the jaws are at rest, and the teeth are in central occlusion, with no opportunity to adjust the line of force. Therefore, an injurious pressure is constantly applied on the occlusal surfaces of the teeth not in occlusal harmony (Figs. 3*a* and 4*b*), causing injury to the periodontium.

The traumatic occlusion during mastication is negligible compared to that which occurs when stress is applied while the mouth is empty and in central occlusion (Figs. 3*a* and 4*b*).

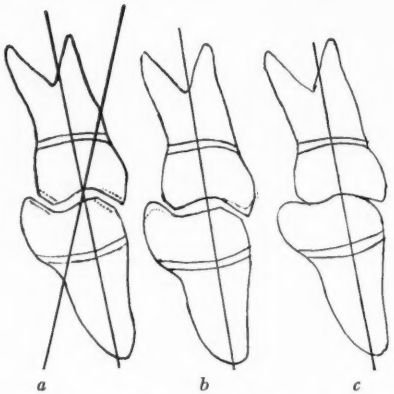


Fig. 5.—*a*, the surfaces most essentially in need of correction; *b*, the surfaces to be relieved by grinding (indicated by dotted lines); *c*, line of stress in central occlusion after correction.

In the act of chewing or masticating food, the jaws move laterally, directing the line of force on the lingual occlusal cusps of the upper teeth diagonally toward the lingual; and on the buccal occlusal cusps of the lower teeth diagonally toward the buccal (Fig. 4*a*). The greatest wear is on these surfaces and the condition of traumatic occlusion illustrated in Figure 4*b* is produced.

Nature has fortified the upper teeth by providing a greater alveolar support on the lingual than on the buccal, and the lower teeth, by a greater alveolar support on the buccal than on the lingual.

Since a large part of the cutting of food is done in our kitchen, by the knife and sausage machine, instead of by the teeth, the cutting edges of the teeth cease to wear, producing the condition of traumatic occlusion illustrated in Figures 3 and 4*b*.

During deglutition, when the jaws are at rest, there is contact only on the buccal occlusal cusps and the lingual surfaces of the upper teeth, and the lingual occlusal cusps and the buccal and labial

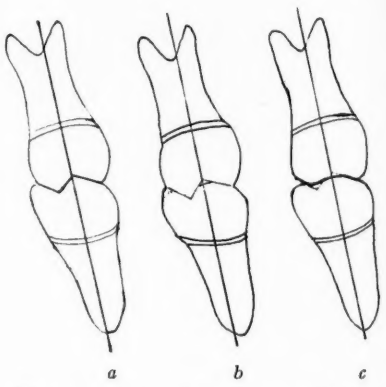
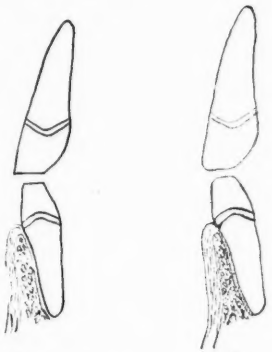


Fig. 6.—*a*, the condition known as lock occlusion, which does not permit oscillating movement; *b*, the points to be relieved by grinding, (indicated by dotted lines); *c*, corrected occlusion shown in Figure 5.

surfaces of the lower. The line of stress is then buccally and labially on the upper, and lingually on the lower, which is the line of least resistance. This condition is exactly opposite to Nature's plan, and is the forerunner of traumatism, with the weaker member suffering the greatest injury.

Each time force is exerted, the teeth yield sufficiently in a lateral direction to close the gap (Fig. 4*b*). Here, again we recognize an incorrect direction of stress.



a *b*

Fig. 7.—*a*, teeth with abrasion so advanced as to form distinct right angles, which act in the same manner as a sharp bladed plane, shaving down the surface it plays upon with great rapidity. When these surfaces are rounded, the teeth glide over without cutting, the abrasion progresses much more slowly and food is deflected from the marginal gingiva; *b*, the corrected condition.

Method of Diagnosing Traumatic Occlusion

The friction caused by the constant rubbing or wearing of two plates of enamel develops the highest polish obtainable on that material. The friction of mastication produces what I will call a velvet polish. In Figure 5*a*, the dotted lines represent highly polished enamel facets. These may be on the buccal or lingual, or on both, as shown.

The surface between the dotted lines has the velvet polish, proving that this surface does not occlude in deglutition. When the entire occlusal surface presents the highly polished appearance, we infer that the occlusion is correct, as illustrated in Figures 1 and 6*a*. In cases in which teeth have been lost, and in which others have drifted, the wear sometimes appears on surfaces other than those designated.

Carbon paper is much used for determining occlusion. This does not seem advisable because (1) its stiffness does not permit it to conform naturally to the surfaces of the teeth, and the paper leaves its mark on any surface with which it comes in contact; (2) sufficient pressure for marking causes slight displacement of traumatized teeth, and, therefore, the markings are misleading. This is also true of the wax method.

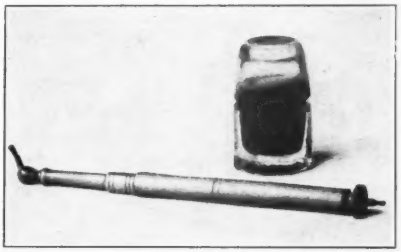


Fig. 8.—Brush and jar of disclosing paste.

The procedure that I have found most efficacious for marking is as follows: Occlusal surfaces are dried thoroughly with compressed air so that the saliva will not obliterate the luster of the high polish. The highly polished surfaces may be more readily detected by the use of an electric mouth lamp that may be shifted and tilted until the highly polished facets are reflected into the mirror. For marking, a mixture of perfumed petrolatum and lamp black should be used. A small quantity of the mix-

ture is painted with a camel's hair brush on the carefully dried, polished surfaces. The opposing tooth is dried, and in order to preclude any displacement, the patient is directed to occlude lightly. By this method, the point of contact is marked on the opposing tooth. This point of contact ought to be relieved by grinding. It will, of course, be the highly polished surface on that tooth.

Method of Correction

The point of abnormal stress being determined, the marked points on the opposing teeth are ground. As a rule, the surfaces which require grinding are the buccal occlusal of the upper teeth, and the lingual occlusal and labial incisal of the lower.

In order to test the efficacy of the treatment, the occlusion should be tested in the manner already described, with a discussion of the diagnosis. When the mark on the opposing teeth is very slight, or does not appear, the entire occlusal surface of the opposing tooth should be dried and again painted, and the patient should be instructed to occlude the teeth. If markings are found lingually and buccally between the dotted lines in the figures, or there is only a trace on the lines, but more distinct marking between them, it may be considered that the desired result has been obtained. Abnormal lateral occlusion can be corrected by the same method.

Summary

1. The first stage of traumatic occlusion is evidenced by change of color in the marginal gingiva. The significance of this change of color is often overlooked.

2. Highly alloyed golds, because of failure to flow under stress, may cause traumatic occlusion, and therefore, when they are used in restorations, great attention should be paid to tooth forms, lines of stress and occlusion.

3. The use of a lamp black and petrolatum mixture in place of carbon paper affords a more accurate diagnosis of traumatic occlusion.

4. In making restorations, more attention should be given to lines of stress and to early detection of evidences of traumatic occlusion.

Discussion

George R. Ellis, Washington, D. C.: Dr. Bricker has attacked the problem of the correction of perverted occlusal relationship with a technic that is as reasonable and conservative as possible in a procedure that is so liable to work irreparable harm. There are certain conditions that obtain in practice in which such methods of relieving stress, as suggested by Dr. Bricker, are quite feasible and improvement is decided, provided, of course, that proper casts of the mouth were obtained on which a definite treatment might be based.

Dr. Bricker's paper, however, leaves the impression that deviations of normal relationships in occlusion, whatever their causes may be, from a local standpoint, are the precursor, or rather the etiologic factor, of periodontal disease. Such reasoning would lead one to believe that all cases of periodontal pathologic conditions are dependent on a preexisting cusp stress, and, therefore, subject to control by the grinding down of areas of extreme impact, thus applying a modification of the well-known principle of surgical rest to the dental region. I am willing to admit that this fundamental principle involved in the question has its judicious application to the dental field, but I am not yet ready to agree that such a complex as periodontoclasia resolves itself in all cases into the simple question of misdirection of force in occlusion. The constantly observed susceptibility of the periodontal tissues to innumerable other conditions, systemic and local, capable of bringing about such disturbances in the local nutrition of the periodontium as to alter tooth position, and thus as a consequence, establish what Dr. Stillman has termed "traumatic occlusion," is a phase of the problem that is well supported by wide clinical experience and persistent observations.

To focus all attention, as Dr. Bricker endeavors to do, on just one manifestation that may rightly be assumed to be but a sequela of a deeper, more complex and remote cause does not appeal to me as a sound principle on which to base a successful and permanent treatment.

F. H. Skinner, Chicago, Ill.: Dr. Bricker states that traumatic occlusion is now coming into its own. This point cannot be contradicted, but the methods of correcting it have been so uncertain that a great deal of damage has been done by improper grinding. The method advocated by Dr. Bricker I believe to be a scientific one, for relieving traumatic occlusion of the natural teeth. Some of our men are using an adaptation of Dr. Gysi's ideas, and in relieving the trauma grind the lingual surface of the upper molar and the buccal of the lower molar, and their results, so far as restoring the normal color of the tissue is concerned, are very good. I cannot, however, believe that the results will be as permanent as when the grinding is done along the lines advocated by Dr. Bricker, in other words, following out the Monson principles of balancing occlusion.

In the case of excessive wear, when a molar or more of the posterior teeth have been lost, or when the overjet, or overbite is pronounced, there is considerable question in my mind whether we should not restore the worn parts with hard gold, rather than grinding off the parts which are not worn; because, in grinding away, we are allowing the mandible to come closer to the maxilla, and unless considerable grinding is done on the anterior teeth, the force, when the teeth are brought together, tends to push the condyles farther back into the glenoid fossae. Anyone who has seen the wet specimens shown by Dr. Prentiss of the Universi.y of Iowa cannot help but recognize the damage that is being done to the mandibulomaxillary articulation through the closing of the bite.

In grinding away the molars, it seems to me we are defeating our aim to obtain normal, balanced occlusion, because, when the mandible is protruded, the anterior teeth only are in contact. In ordinary conversation, deglutition, mastication of soft food, or chewing of gum, there is constant trauma on the anterior teeth, or high portions of any other teeth which extend above or below the line of balance, the occlusion is not in proper balance, and the result, as Dr. Bricker says, is injury to the supporting tissues, followed by inflammation, suppuration and absorption of the process.

Dr. Bricker has pictured clearly the direction in which force should be applied. Teeth will not stand a lateral stress. This was illustrated to me last winter by a man who has a reputation for beautiful crown and bridge work. He stated that he had lost a great many beautifully made bridges, because he had not been paying enough attention to the principles of balanced occlusion according to the Monson ideas; whereas, very extensive bridges made along these lines were standing the test of time, because of the well-balanced occlusion. Regarding hard and soft gold, I cannot conceive of soft gold standing up under the stress of mastication which is brought to bear on it. Cold flowing of gold, probably in time, would cause the teeth to fracture. I have six crowns over vital pulps in my own mouth, and the whole sides of the teeth have been fractured off, I believe wholly because gold that was too soft was used. Dr. Bricker's position is well taken in reference to the care which must be observed in obtaining balanced occlusion when hard gold is used in occlusal restorations.

Patients should be seen at intervals of a few months, or less, for treatments to insure prophylaxis, and the operator who, during these periodic visits, does not observe the soft as well as hard tissues in the mouth, is neglecting his work. As diamond cuts diamond, tooth will wear tooth; but gold will not wear tooth, nor will tooth wear gold. It is the duty of the operator to watch for burnished spots on the gold as well as for congested areas in the gums, and to relieve either the tooth or the gold by grinding the high spots as indicated according to the lines of balancing occlusion advocated by Monson, unless opening the bite is indicated. Nature usually builds up a wonderfully strong process around teeth, providing the stress of mastication is brought to bear parallel with the long axis, but if the cusps wear so that a lateral force is produced, it will not take long before pathologic conditions begin to develop which will eventually cause the loss of teeth, unless the trauma is detected in time and corrected. There is nothing that indicates trauma earlier than the change in the color of the soft tissues, and if the slight changes in color are neglected, a typical case of pyorrhea will develop in the course of time.

The depressing of a tooth or teeth in the process of setting a bridge, crown or inlay is a common occurrence. Patients frequently assure you that they strike the other teeth first, yet, in a few days, burnished spots will show on a crown, bridge or inlay. You know that the occlusion must be balanced or trouble is going to follow. Dr. Bricker's point of seeing the patient in a day or two should be made a regular routine of practice, because no matter how artistically and successfully the work is done, it is going to be a failure, unless the occlusion is absolutely correct. In my practice to obtain balanced occlusion, I am building up, i. e., opening the bite of natural teeth, restoring their lost parts and compensating for lack of process development, fully as often

as grinding off high spots. I believe a restoration of lost parts of teeth or compensation for lack of development of a process is the only way to develop correct anatomic relations. I am convinced the time will come when we shall do less grinding and more restorative work, because it is the only way in which reasonably lasting results can be obtained.

Dr. Bricker has a clear understanding of the abnormal stress brought to bear upon the teeth, and his diagrammatic drawings explain clearly the points in his paper. I wish to thank him for bringing to our notice this disclosing paste. I have always called it "high spot paste." The articulating paper and wax are very useful in the first rough grinding, but when it comes to really relieving traumatic occlusion, this mixture of petrolatum and lamp black is much more definite than the other two, but the surfaces must be kept dry during the time that it is being used.

I would utter a word of caution about grinding, which in correcting occlusion is an exacting dental operation and one in which it is easy to make a mistake. A little too much grinding in one place will start traumatic occlusion in another, and when that is relieved, there is still another place to be ground, and finally the patient's teeth have been shortened too much; so it is better to take off a little less than we think necessary, try it for a week or two, and then do a little more grinding if necessary. If one can get a mental picture of the 4-inch radius and apply it to the occlusal surfaces of the teeth, it will help him a great deal as to where to grind. In a great many cases, it is unsafe to grind before models have been mounted on an instrument which approximates the normal mandibular movements, and a thorough study made of the cusp planes in their different relations. Staining the cusps of the plaster models with brown shellac or ink, after they have been mounted on the instrument, and then rubbing them together will reveal high spots otherwise very difficult to detect.

J. M. Prime, Omaha, Nebr.: I am particularly pleased to learn that Dr. Bricker does not condemn highly alloyed or hard gold. If you think that you can build up the masticating surface of the teeth with soft gold, lead-like in resistance, you are deceiving yourselves. Dr. Bricker sounded a note of warning when he said that the problem was not in the resistance so much, as in the wearing of the hard gold, but was in the lack of coordination between these restorations. I believe that we all ought to go back to fundamentals and build up the teeth for the purposes of mastication. For instance, Nature has built the molar so that its occlusal surface over its greatest buccal-lingual diameter is one-half as great as it is through its greatest diameter bucally, a remarkable thing, teaching us that Nature knew that she must limit the leverages to be brought upon the tooth.

We talk about contact points. There is just as much contact intermaxillary as there is interdentally or proximally. The teeth are built with rounded form, and when normal they close occlusally, just as they do approximally; in other words, the two come together in convex surfaces forming a contact point.

In sounding a note of caution about overgrinding, Dr. Bricker has given us a method of grinding that is worth trying. The function of the teeth is absolutely involuntary. We deal with a voluntary bite in our office instead of an involuntary bite. When the function begins to operate involuntarily and unconsciously, we experience trouble. There is an involuntary bite when at the table and when swallowing. We should have these patients return to us frequently to check up on these things. We can usually get good results by studying the case and grinding the teeth, but these patients must return again and again so that we can determine the result of these operations. Otherwise, they will return, saying that the tooth aches. We examine it, and we find the cause.

These drawings are instructive to all of us. It seems we do not fully realize that when the teeth are worn and changed the intermaxillary relationship is involved, because the bite is shortened and the mandible slips forward, and the leverages are tremendously increased. We should get back to first principles and avoid fantastic theories. The gold used in restoring occlusal surfaces of the teeth must be hard. Enamel is very hard. These operations must be watched, through the course of days, weeks, months and years, and a balanced relation must be maintained in the occlusion.

A. B. Price, Richland, Ind.: I started with restorations of the occlusal surfaces with soft gold. I find that the soft gold is liable to mash out, and give you a wire edge. For the last four years, I have been using a platinized gold for my restorations, and I find that it saves the teeth, and also when both teeth are meeting, you restore one and probably save both of them. In Indiana, a great many men chew tobacco, "scrap," that will cut a tooth faster than anything else because there is a fine grit in it. When you get a traumatic condition on one side, it is liable to go to the

other side. In obtaining the occlusion, I take hard black wax, soften it in the flame, and have the patient grind thoroughly on it. Wherever there is a hard contact point, it will cut entirely through that wax, and one can get the exact condition. Just where the wax cuts through the least bit of it can be cut off with a fine stone, but if too much is cut off the point will be thrown some place else.

Dr. Bricker (closing): Dr. Ellis said that he did not think it was advisable to take up just this one phase of dentistry. I heartily agree with him, but I was asked to give this one phase of it. We should cover all phases of dentistry, diet, etc. I believe diet is going to be a great factor in maintaining the resistance of decay of the teeth and their supporting structures. A friend of mine at this meeting who has not been attending to his diet, has tender gums as a result; so you see the alimentary crack has a connection with the gums and soft tissues, and all factors must be taken into consideration.

Dr. Skinner speaks of opening the bite, which is, of course, strictly proper when the teeth are abraded a great deal, and if they have worn down so that they are interfering with hearing and the muscles are not functioning properly in the act of deglutition. We have so many cases in which the teeth have been abraded to that extent; but sharp angles have been produced, and if we do not remove them they will wear down more rapidly. Rounding the angles will also deflect the food from the gum margin. Opening the bite is a proper procedure when the abrasion is extensive.

Proper brushing is necessary. If the patient is instructed to stimulate circulation in the mouth and if stress is placed on stimulating circulation in the gum septum, a condition of resistance in the overlying structures of the teeth greater than the resistance required to wear down the teeth can be developed and thereby many cases of periodontoclasia may be prevented.

Dr. Prime is an authority on tooth form. I believe the marginal ridges are the important factors to keep in mind.

I wish to emphasize the fact that the normal lines of stress on the teeth and normal forms must be preserved, with avoidance of conditions producing excess stress, especially in cases of large restorations. A patient should never be dismissed after a large restoration of either inlay or malleted gold until the occlusion has been tested the following day and correction made if required.

Dr. Prime: Dr. Bricker misunderstood me or else I said something which I did not intend to say. My statement was that a molar tooth almost invariably was one-half as great in breadth from the top of the cusp, the top of the marginal ridge. The molar has a marginal ridge entirely circumscribing it on its occlusal surface, broken by spillways, buccally, mesially and distally, and the marginal ridge on its occlusal surface, buccally-lingually, is one-half as great as the greatest diameter of the tooth buccally-lingually. That is what I intended to say, not mesially-distally.

COMMUNITY DENTAL SERVICE

By MICHAEL M. DAVIS, Jr., Ph.D.,* New York, New York

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THE subject of Community Dental Service is so broad that I must necessarily treat only a few of the high spots. I need hardly do more than mention the fundamental point from which one starts; this is, that service to the community is at present grievously inadequate. If one figures up the number of dentists required to give complete dental care to a population of 100,000 or to nearly 3,000,000, as Chicago has, one soon knows that there is no community in this country that has enough dentists to give complete dental service to all that community, even assuming that the expense is not to be considered. At present, and for a long time to come, the amount of dental service available is so small that it is and will be impossible for every member of the community to get complete service. That point is fundamental, and it is very plain that to give larger service to more people we must reckon with this inevitable shortage. The situation is different as regards physicians—some think there are too many. That is an open question, but it is a certainty that there is no such shortage of physicians as of dentists. In terms of numbers, in most of the large communities in which I have made estimates, the number of dentists is about one-third or one-half that which would be necessary to give complete service to all adults and children. In the smaller communities, in the rural districts and in the South—the least developed parts of the country—the shortage is even more serious.

Even if the personnel were available, the cost in dollars to the community under present conditions would be staggering. In terms of money, a complete dental service to the people of, say Chicago, aside from what can be paid for by the individuals on a fee basis would run up to not less than twenty and probably not more than thirty million dollars a year. In New York, these figures would be multiplied by a little more than two.

If you look over the country, you realize that the outstanding cities that have the best community dental service are not the great cities, such as New York and Chicago, but the medium sized cities, such as Rochester and Bridgeport, and even smaller cities, as, for example, Flint, Michigan. Other places with a service not quite so complete are yet ahead of the cities of the first rank in population. If one seeks a reason, it is probably because the problem, in terms both of service and of money seems so big as to be discouraging. I think at the present time it is not practicable to expect to get enough money to cover such large sums. When we remember that, in most communities, the money spent for health work by public and private agencies rarely amounts to as much as the cost of a complete dental program, which would be about $10 per capita, the outlook appears dark indeed. If people will not pay as much as $2 per capita for public health work can we expect them to support a special branch of health service, such as dentistry, at the rate of $10 per capita?

Taking this into consideration, what can be done? It seems to me that a

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definite, clean-cut policy is necessary. If money is limited, as we all know it is, what can be done to make the limited personnel and limited money get results? The lack of a definite policy is rather serious. In New York City, at present, with six million population, we have more than 100 different dental services in hospitals, clinics, churches and schools, besides three dental college clinics. Yet these sources are mere drops in the bucket and, furthermore, the 100 and more organizations are working upon no definite or concerted policy, with a few exceptions, one of which I will mention.

The people with dental needs that seem most urgent are brought to these clinics by interested people, or they come themselves, brought more or less by the urgency of the moment. The result is that nowhere is there a deep impression made in the great dental need; no very effective results can be shown. The flood of dental decay pours on, and these many haphazard efforts are swept aside. If, however, the limited funds were centered on certain definite points, an impression might be made. The flood might not be stopped, but it might be directed into channels where it would do the least damage.

On what points may this limited personnel and limited fund be concentrated? On two main points: first, on work with *children,* along preventive lines primarily. These are familiar to you and I will refer to them only briefly: a preventive program of three parts—(1) cleansing of the teeth; (2) education in hygiene, and (3) such reparative work as is absolutely necessary.

There have been some important demonstrations of such a program, the first being in Bridgeport, which is known to you all. This has shown that, following particular concentration on young children, two things happen. In the first place, the general health of the school children is greatly benefited, and the general public appears to be benefited as shown by a diminution in certain contagious diseases, particularly those of childhood. Recently, there has become available the report of an experiment in New York that is not yet public. This experiment was attempted by a private organization, "The Association for Improving the Condition of the Poor," an old established society. The work started with the professional advice of some of the best known dentists in New York City. For four years, the society has been conducting an intensive campaign in a certain district, having a population of children of the preschool and younger school ages (kindergarten to fourth grade) of about 6,000. For four years, they have been concentrating on these children. The policy adopted is (1) prophylactic cleansing at least once a year, and twice a year if possible, for all children in the first five grades in school; (2) extraction of all diseased teeth and putting of the mouth in hygienic condition; (3) prophylactic fillings to prevent decay in all first permanent molars; (4) silver nitrate treatments to arrest decay in the deciduous teeth that are retained longest.

In pursuing this program each year, the statistics regarding the children have been very carefully collected. About 6,000 dental cleanings have been done in a year. That means every child has had one and some two cleanings each year. The number of teeth extracted has been approximately the same throughout each of the four years, about 1,200 being extracted each year. The number of fillings has shown a rather remarkable change in the four years. In the second year, there were 8,200 fillings; in the third, 5,400; in the fourth, 4,000, the number of fillings needed being reduced by one-half between the second and fourth years.

The children, of course, were given a careful dental and physical examination at least once a year. In the beginning, the proportion of children needing no dental work, those whose mouths were clean and in good condition, was only

10 per cent. Toward the end of the fourth year, examination of the whole group of children showed that 40.7 per cent needed no dental work.

The figures are even more striking if you take the children in the last grade of school who had had the benefit of this service throughout the four years. The children showed especially good effects of the campaign. Among children in the upper grades, who had *not* been through this course of treatment, 85 per cent needed dental care; whereas, among the children who had been through the four years, less than 35 per cent needed dental care.

The meaning of these figures, which substantiate closely those from Bridgeport, is obviously, that, beginning at the kindergarten age, the amount of dental work needed by the children has been substantially lessened, and the dental service actually rendered has been reduced. The cost of the complete dental program for all the school grades we are not yet able to determine definitely, but it is clear that this cost will be greatly reduced simply by concentrating on the first half of the grades. It is shown clearly that while the necessary dental work may cost from three to five dollars a year for each child, concentration during the first years will actually save money in the end. These figures will come out within a few months in a printed report by the Association for Improving the Condition of the Poor.

It is not easy to bring about this concentration for several reasons. If we open a clinic, there is at once a demand to fill it with all kinds of supposedly emergent or especially needy cases. It requires courage and great faith to turn aside the older children, and yet it seems necessary.

As regards adults of the community, the amount of dental care needed is so great that it is impossible to deal with it. Certainly, not more than one-third are able to pay for all the care they need from dentists. For adults, I believe the dental program must be based upon what might be said to be a medical foundation. That is, the first demand on the limited dental resources of the community is for those adults whose condition needs attention for other than cosmetic reasons, especially those whose mouth conditions involve systemic disease. Sad as it is to realize that the teeth of the large percentage of adults must go on decaying, a choice must be made, and I believe that the medical basis is a sound and practical one. Such a dental program for adults must be carried out chiefly by dental clinics, not the clinics that are maintained by dental colleges, and by the clinics associated with hospitals that deal primarily with the sick. Preventive work, such as prophylaxis, should not be denied adults, but should primarily be with persons selected on the medical basis explained above. The nature of this program and the need of it might be illustrated by a story. A six year old boy, whom I know, has a neighbor with a good sized garden, which the boy likes to water. He has a sprinkling can about the size of a coffee cup, and he fills this up and waters the ground. With a garden of such a size and a youngster and a pot of such a size, what can you expect? The boy trots to some plant that attracts his notice, and saying, "Poor little plant," and puts a little water on that, and then goes to another little plant and puts a little water on that, so that you can see a few damp spots here and there. It takes a lot of water to be effective, but this little boy is very proud of his work and tells the neighbor who owns the ground that he has watered her garden. You and I can appreciate that he does not do much good to the garden. A policy that puts dental service in scattered spots is of about as much use as the work of one little boy with a pint watering can in a half acre garden.

With respect to carrying out a community dental policy, it is well to ask how far private dental practice can carry

the burden. It seems to me that it is unreasonable to expect private dental service to carry much more than it is now doing, and that we must turn to the dental clinic as our main resource. The dental personnel in the clinics must be remunerated. It is gratifying to observe that the dental profession is making a definite stand against encouraging or accepting the tradition of unpaid dental service in clinics. Unpaid service is a fine, but too frail weapon to fight a big problem with. Payment for service adds to the expense, but that is a necessary part of the program.

Where can a dentist do the most good? If he is serving a given number of patients in private practice in a given time, can he serve more in a clinic in the same time, thus rendering more service to the public via the clinic? If the clinic is properly organized the answer is "Yes, the dentist can do more in the clinic." A part of the dentist's time in the clinic, for reasonable pay, is a proper part of a dentist's work and a necessary part of the dental profession is to render to the community the service which it needs. Dentists should be paid for clinic service. Patients should pay for clinic service. I think the service to adults should be as well paid for as is possible. A community program for adults on a charity basis is financially impossible and morally undesirable. There are, of course, a certain number of people who cannot pay anything, and for these persons arrangements must be made, but those who can pay, even one-fourth or one-half of the cost, are in the majority, and they should pay.

A discussion enters here. By what plan shall we select those that should get this service from those that should be in the offices of private practitioners? On the whole, these two classes have a habit of separating themselves pretty well. There is a certain proportion of people who like to get something for nothing, who like to get a ride free on the street car if they can manage not to pay the fare; but, on the whole, most people like to go to private offices if they can. In my experience, the number of people who can afford to pay and who nevertheless go to clinics, is very small. Furthermore, I am inclined to believe that in every bit of work done by dentists in the clinic there is a certain amount of education accomplished, so that people will seek further dental service when they can afford to pay for it. The child sent home with shining teeth is an example to the family to seek more and better service and not wait for a definite pain in a tooth. I think the establishment of just as many clinics as the dentists can possibly man should be encouraged. I think these clinics should charge fees up to the cost of service; that the dentist should be paid, and that it is practically unnecessary to institute any elaborate system of weeding out those who can afford to pay full prices; for most of them will go to private offices anyway.

Another avenue opening in some communities, which I think has some future ahead of it, is the clinic associated with large mercantile manufacturing companies. In New York, we have several, among which may be mentioned the one in connection with the Metropolitan Life Insurance Company; but, on the whole, the industrial clinic is a service for adults that is not the fundamental part of dental service to the community. It is, however, important to encourage these clinics. The establishment of dental clinics in every hospital and dispensary provides one of the best channels for getting the needed work for adults done. Every hospital should be considered incomplete if it has not a definite dental clinic and dental staff, just as every hospital would now be regarded as incomplete without a roentgen-ray department.

A word should be said regarding the dental hygienist. It is unfortunate that in this state there is not a state law

specifically permitting the work of hygienists, although I am informed that the present law probably has enough loopholes to allow hygienists to practice. The hygienist is a fundamental factor in any program. The cost of a hygienist's time is less than one-quarter that of a dentist, so that when hygienists are allowed to clean teeth a great saving is made. It is unfair to expect this work to be done by dentists when it can be done well by those whose time is so much less valuable. In Massachusetts, a few years ago, there was an active minority opposing this law. A member of the dental profession who headed this minority said that a dental hygienist's law would be passed in Massachusetts only over his dead body. That remark was curiously prophetic, because, the year after he died, the dental hygienist's law was passed in Massachusetts. The dentists of Massachusetts are now satisfied with the law and find that the number of dental hygienists is far too small, and that instead of taking work away from the dentist, the hygienist, with every mouth that she cleans, is encouraging people to seek dental service when otherwise they would not. Any definite dental program, for children particularly, that does not include dental hygienists to do the prophylactic cleansing and a certain amount of educational work does not get anywhere; for service by dentists alone cannot be provided in sufficient amount to accomplish this mass of work as a routine.

The financing of a dental program is a difficult, almost delicate subject. The figures for a complete program run up to such huge numbers that they seem utterly discouraging. Yet if only a partial program can be set under way there is a great danger in starting dental clinics without a picture of the complete program in mind. The general public that "puts up" the funds may not see the necessity of putting up enough to do the whole job. The public needs education, but while it is being educated and convinced, you must make a beginning; and how? The dental profession is already convinced, but how shall the public be convinced? Practical demonstration is the chief answer. You must concentrate on work for the young children and show results. From this point of view, I think what has been done by the Association for Improving Conditions of the Poor in New York City is most significant. The problem in New York is different from that of Bridgeport. There you have a population of 15,000 or more and enough money to do the whole job is obtainable. In New York City or Chicago, the money needed for a complete program would run into the tens of millions annually. We cannot make a demonstration of the effectiveness of a dental program in New York or Chicago except by taking a certain small area and showing what can be done therein. This demonstration must be made with private funds, for you can rarely, if ever, persuade taxpayers to concentrate on one district and limit the work to it, because the city officials are immediately faced with this proposition: "You are giving that district attention, but here in other districts we have nothing. Here are children who need the work badly, why deny them?" The city fathers therefore usually insist on spreading the butter they have over the whole slice of bread, even though the slice is big and the butter very thin. You have to demonstrate new work by private funds and, furthermore, I think you have to have such a demonstration in any large city in order to educate the public concerning real dental needs and a real dental program.

It is strange, but true, that this sort of demonstration is never convincing to any other city or state except the one that makes it. Each locality seems to want to do its own experimenting. I think that in Chicago, as well as elsewhere, you have to do your demonstrating on your own soil. I hope you soon will work out an experiment on a concentrated group of children which can be

carried through for four or five years to demonstrate the value and the expense of a systematic dental program. Thus, you will educate the public to the necessity of the work, to cover gradually the whole community.

As for finances, the greatest single resource is the payment by the beneficiaries themselves so far as adults are concerned. The children can pay a little, but not much. For them, this part must be borne by the city or by private citizens. For adults, the work can be largely self-supporting, but not wholly so.

Conclusion

I wish to urge again the importance of public education in the meaning and the value of a dental program, and the importance of close relation between the dental profession and other groups in the community. No profession quite appreciates how specialized it becomes. I remember a story I heard at another dental meeting not long ago. A well known dentist was staying at a hotel that happened to be headquarters and this man had the misfortune to be a sleep-walker. He was a specialist in a live branch of dentistry, known as orthodontia. He escaped into the corridor one night in his pajamas and was met by one of the porters who promptly seized him by the shoulder and shook him. Our dental friend, not realizing where he was, thought he was in the hands of a policeman, and he said, "Don't arrest me please, I am an orthodontist." "I don't care," said the porter, "what church you belong to, you can't walk this corridor in your night-clothes." The porter was not entirely clear as to just what an orthodontist was or where he fitted in, but assumed that he must belong to some kind of an institution and thought it was a church.

I think we do not realize how little the public understands of the many different groups and the technical terms used, and for that reason it is important that, in working out a definite program, the dentists should associate themselves very closely with medical groups and with lay groups, national as well as local, particularly the public health workers. Among the lay groups, two have great importance to dental programs. Many of the large business interests themselves employing or financing the employment of thousands of individuals can easily see the importance, from the standpoint of working efficiency, of an effective dental program. These business men cannot help in working out the technical details, but they can aid in translating them into terms the whole public can understand. Particularly important also are the women's clubs. They are now not only of intellectual but also of political significance locally and nationally. The community dental program dealing, as it largely does, with children appeals particularly to women, and it is very important to arouse local interest among the women's clubs, in order to carry over among private groups and through appropriations of public funds the technical program which the dentists want.

I believe that no phase of health work is more important to community welfare and public health than is community dental service. It is very gratifying to see a great organized body, such as this, firm in the forefront of a great movement of this kind, prepared to push it forward, to help finance it, and to make it count in terms of benefit to the citizens, and above all, to the children of the community. Unfortunately, a dental service requires looking ahead at least twenty years to see its full effects. Thousands can see the value of pulling out an aching tooth, to one who will see the necessity for treating a child in order to bring him up, without serious dental decay, with the assurance that he will in turn bring up his children likewise. We must have the long look ahead. We must count on the children. It requires patience and faith and hope to carry out such a program, and I, as a lay worker, congratulate you that you are embarked on it.

HOW HAS MOUTH HYGIENE PROGRESSED IN THE PAST TWELVE YEARS?

By CORDELIA O'NEILL, Cleveland, Ohio

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

AT this time, we surely would advocate a "League of Professions." Civilization has entered a new era. Now no profession or calling can hope to live and grow in isolation any more than can the nations of the world. More and more the educational profession is calling on the dental and medical professions for assistance in solving their problems. Our complex civilization; our tendency to congregate in crowded communities; the multiplicity of distracting amusements; the seriousness of food adulterations; these have made the problems of teaching and preparing children for their life work most difficult. It is quite fitting that there be a reciprocity of activities among the professions whose duties fit children for citizenship.

The Marion School experiment, while it was characterized as only a "drop in the bucket," illustrates what good can come of this cooperation. What I have to say now is undoubtedly well known to all of you; still, coming from one outside your ranks, it may have a helpful significance. I shall recall a few facts that were responsible for my appearing before this section twelve years ago.

When we concluded our work with the Oral Hygiene Committee of the National Dental Association in July, 1911, some accused us of lack of enthusiasm over the success of the work. Our answer was that we would enthuse if the effect of the work would last ten years. It has not only withstood *twelve* years of test, criticism and application, but has also been the foundation of valuable results. The true worth of the work was realized at the time by only a comparatively few persons. In 1911, only about eight of the more important cities of the United States were attempting to establish dental care of school children. Today, there are scarcely eight cities, towns or villages of any significance in which someone has not advocated mouth hygiene education in some constructive organized form. If the permanent results seem small, we must consider the obstacles to be combated in the form of general lack of knowledge combined with the disturbance of established business. Any slight progress must be classed as a great gain.

For years previous to 1911, some dentists had attempted to teach Mouth Hygiene to the masses. They could make but little progress because there was no concrete, definite data. They secured little action from boards of education or commissioners of health. The Oral Hygiene Committee of the National Dental Association conceived the idea of making an experiment that would prove that a thorough course in mouth hygiene, including a practical test in the care and use of the oral cavity, would increase mental ability or attainment.

Here are a few brief facts: Marion

school, in the congested section of Cleveland, was chosen as the place for the experiment. Forty of the worst cases of mouth defects from a group of 845 were selected. In twenty-seven of the forty the entire work was completed. Psychologic tests were given the children at the beginning, during and at the completion of the work. The mouth defects were corrected. The children were taught correct hygienic practice in the care and use of the oral cavity and in the selection and mastication of food. They were under careful supervision during the entire period. The time taken for this work was fourteen months. At the close, it was found the children made a gain of 99.8 per cent in the records of the psychologic tests, and besides showed improved appearance, better health and increased self-respect and self-reliance; all of which made the children more educable.

Psychologic tests, which were used for the first time in Cleveland, have now been generally adopted and are being used in Cleveland and elsewhere for classification and promotion of children. The results sought for in the experiment had been obtained. More time, more money, fewer handicaps would have accomplished greater results, but twelve years have elapsed and the work done then stands out preeminently as a milestone in the progress of education and hygiene.

Previous to 1911, few medical or dental authorities, and fewer still of the laymen, placed any importance on the teeth as a factor in health. General health literature made no reference to them. Today, scarcely any article on health appears that does not stress their importance. In fact, the criticism now is that diagnosticians go too far and place too much emphasis on mouth conditions. From what I have been able to find in health or educational literature, our experiment was the first to emphasize the importance of nutrition as a fundamental in educational work. From the developments of the past twelve years, it has been proved that it is a most vital factor in mouth hygiene and education. One authority tells us, "Persistent malnutrition of the body sooner or later shows its pernicious effects in the processes of the mind." Another says, "Serious conditions in the oral cavity give the child the appearance of mental deficiency; if corrected, the child becomes normal." Education and mouth hygiene are inseparable. In the experiment the cleanliness of the teeth was stressed. While cleanliness is important, we know that caries develops in a so-called clean mouth. The quality and kind of food is of vital importance in mouth hygiene. The cleaning is important, but only to correct and counteract mistakes that are made.

It is found that about 90 per cent of the children have from one to twelve cavities. Much of this is attributed to the quantities of sugar consumed, also to the high degree of refinement to which wheat, sugar and other foods are subjected before being placed on the market for public consumption. To counteract this, the toothbrush must be called on to supply the friction that foods in coarser form might supply. The European peasants who come to our shore usually have good teeth. When they have accustomed themselves to American diet, their teeth suffer. Yet there is the strange anomaly of our boys during the World War whose teeth, we are told were the "admiration of all Europe." Still in the 38 per cent rejected from service because of physical defect, many rejections were for defective teeth.

Progress

What are some of the accomplishments? During the past twelve years, there has been a great awakening in the

field of mouth hygiene. As was stated, the number of school systems and city or rural health boards that have taken a definite stand and attempted to work out a program has been increased many hundred fold. Dr. Mayo has said that the next great field for surgery is the mouth. It is only in recent years that the dentist has been considered an essential member of the hospital staff.

It is coming to be a practice for the alert medical practitioner to look at the teeth now in much the same way as the old timer inspected the tongue to detect causes of systemic disturbances.

The Forsyth Institute, Boston, Mass., and the Eastman Dispensary, Rochester, N. Y., have been established. The Flint, Michigan, schools have done some continuous followup work that has been illuminating.

McDowell County in West Virginia has demonstrated the value of dental clinics for that state, and school men there say it has passed its experimental stage and is ready to become a fixed part of the school program.

An eastern penitentiary warden who established a dental clinic and persuaded his guests to practice mouth hygiene found the behavior and spirit of the institution improve most satisfactorily.

A Chicago school district fought an epidemic of scarlet fever and could not check it until it adopted the plan of having the convalescent pupils report to the dental clinic to have their mouths put in condition, thus checking the spread of fresh contagion from each little germ carrier on his return to school. Chicago is now working out a plan that is worth watching.

The Boston parochial schools found that attention to mouth hygiene cut down their percentage of absence markedly.

Last year, in Cleveland, the director of the school dental clinics made a study of the incidence of scarlet fever and diphtheria in each school district in the city. He then made a comparison of the incidence in the schools in which clinics were established, with that in the schools which did not have that service. There was a noticeable degree of immunity in the schools in which hygiene was taught and practiced.

Not only do the schools find it expedient to recognize the value of mouth hygiene but industrial institutions also have found it greatly to their advantage. While the movement for clinics in factories is only in its infancy, great strides have been made. Any business will thrive if its workers are kept physically fit; and dental service is essential to physical fitness. Some industries so located that dental service was inaccessible have installed dental equipment in their own plants to save the time of their employes who need such service and would be obliged to go some distance for it.

These are but a few typical cases that have substantiated the facts brought out twelve years ago by the Marion School experiment. While it is not claimed that they are a direct outcome, the influence on the mouth hygiene movement is unquestioned.

During the experiment, greater emphasis was placed on cleanliness of teeth and lesser emphasis on diet. Experiments carried on since then are proving that diseased conditions of the teeth are often caused by diet. In fact, we have some authorities who claim 80 or 90 per cent of all diseases, except infectious and contagious, are due to diet. There is no doubt that the fundamental cause of tooth trouble lies in the way we live and what we eat. While valuable experimenting is now going on to find the best diet, there can be no cessation in the need of prophylaxis for the preservation of the teeth.

Persistent malnutrition of the body sooner or later shows its effect in the processes of the mind. Marshall tells us, "One of the marked symptoms of oral sepsis in school children is mental inefficiency." It is a woeful waste of public funds to spend money trying to educate a child who is not in fit mental condition to profit by instruction. If it is true that oral sepsis detracts from mental efficiency, it is our duty to remove the cause. But how discouraging to rid the mouth of disease, if, as soon as we finish, new destruction is caused by incorrect diet. To be sure there is danger of laying too much stress on diet, just as too much is sometimes attributed to the teeth. Nevertheless, results seem quite problematic when we stop to realize the extent to which adulteration of food is practiced and the hold the attractive candy trade has on everyone—man, woman and child.

If for all that has so far been accomplished by mouth hygiene, so little result is seen; if, as some say, we are only "scratching the surface," let us still rejoice, for our obstacles are almost insurmountable.

Future Outlook

Let us consider for a moment our outlook for future progress.

It is today generally accepted that mouth hygiene is an essential to health. Health is a necessary foundation for education and achievement. There is a complete cycle, as is often found in Nature. Malnutrition causes tooth defect and decay; and likewise diseased teeth bring about a systemic condition resulting in malnutrition. Both are detrimental to health and impede mental as well as physical well-being. What are we to do? We are to begin with the child, the sooner the better. The solving of all the problems of children of preschool age will be left to the agencies that deal with those cases. We will discuss the outlook as it effects the child during school life.

Our first efforts should be with the dentists themselves. It is appalling to see how little the average dentist seems to know or care about preventive dentistry. They no longer can hide behind the plea that educating the masses to precautionary care of the mouth will rob them of their work. The past twelve years have proved that there is more work than can be taken care of. The number of young people entering the profession shows its increasing popularity. The future hope of mouth hygiene lies in the education of the coming dentist. Some of our dental colleges are preparing for this by revising their curriculums and by increasing the number of years required for graduation. The dentists trained only in the old idea of rebuilding and repair work will find plenty to do. Long established habits of eating, unchecked adulteration of food, laxity in hygiene practice will allow caries to go merrily on, breaking down the tooth structure and providing ample work for men trained to do it.

If the younger members of the profession are led to see the value and opportunity of prevention, we will probably see the day when children referred to their family dentist by the school clinic will not be met with the statement, "Those are only baby teeth and will come out anyway, so why bother?"

The United States Bureau of Public Health at Washington has issued a bulletin urging parents to watch particularly for the protection of the first permanent molar. To the shame of the dental profession, we still have dentists who refuse to treat this tooth. In one case that undoubtedly is typical, the parents took an only child to the family dentist. Treatment was put off, and the next year

the tooth had to be extracted. The parents were anxious to have the work done but relied on the advice of their dentist. They discovered their mistaken confidence too late to save the tooth. How can anyone accept a diploma and then mislead the laity in that manner? And you know that similar instances occur in every state which you represent. So generally have the dentists sidestepped work on children that it is almost impossible to find any literature on the subject. In fact, dentistry for children is still in its infancy.

The next strong effort should be the education of boards of education and commissioners of health. All communities cannot produce a Forsyth or an Eastman. Institutions privately endowed have the splendid advantage of being free from the instability due to shifting of political control. They are also more liable to have a continuity of ideal, which is so essential in the early stages of any movement.

Where a Forsyth or an Eastman is not available, public funds must be sought. But when public funds are used, there will inevitably be politics. The only hope, then, is having a well informed laity and intelligent public opinion. There should be more popular literature on the subject and continuous rather than spasmodic propaganda. The prejudice against change or innovation is not confined to any one line of endeavor. Each new invention, each new discovery that threatens a change in life habits is viewed with suspicion and distrust. Mouth hygiene has experienced this, but has weathered the storm, and has come to stay. We cannot flatter ourselves that there are no breakers ahead. The instability of public control will require constant vigilance.

The coming of the dental hygienist is the salvation of education in the care of the mouth. She will do the work that the dentist cannot or will not do. Care must be taken that men and women of a high type are attracted into the field and that sufficient remuneration is secured to hold them in the work. This continuity of service will secure the advantage of experienced workers. There is danger than work as a hygienist will be used only as a stepping stone.

The greatest obstacles, however, will be the question of diet. Practically every school building in the country has its adjacent candy store under the caption of "school supplies." To educate children or parents away from the attractive and tempting concoctions is going to require a campaign equal in proportion to the prohibition or suffrage movement. You and I won't live to see it accomplished; but the way must be prepared now. The influence of the amount of capital invested in the candy and ice cream business will serve as a deterrent. There will be manufacturers of machinery for the refining of flour and sugar as well as manufacturers of all types of patented foods to enter their protest. So attractive have been the fortunes made from the sale of patented foods that it has stirred the imagination of many high school and college boys. They take up the study of chemistry with the hope of being able to produce a formula for a patented food that will bring them a fortune. Our American people seem most willing to second their efforts.

The habits of several generations are hard to change. This makes the next step necessary. Ninety per cent of the children who enter the first grade of school at the age of 6 years do not go beyond the eighth grade. Mouth hygiene must be taught during those formative years. Habits of selection and taste for the right kind of food should be cultivated; but even if progress is slow, it will be satisfactory, for it is a most ambitious and stupendous undertaking. If chil-

dren, in this training, are taught the necessity and habit of continuing regular dental care through life, they will have advanced a long way. If they can be induced to end a meal with a coarse acid vegetable or fruit that will clean the surface of the teeth instead of the soft, sweet pastry or puddings, much difficulty will be forestalled. If they can be made to feel that they must either *use* or *lose* their teeth, there will be better mastication.

For a long while yet, the task will be correction and repair. When parents are educated and aided sufficiently by the medical and dental profession to send into the schools at 6 years of age children with normal mouths, the encouraging stage will have been reached, and that need not wait for the millenium.

There will still be the fight to *keep* the teeth healthy. So long as soft foods, incorrect foods and, worst of all, adulterated foods are eaten, so long will continuous tooth decay obtain.

Another work that must be continued is establishing mouth hygiene as a part of the educational program. It must be connected with daily instruction either directly under school management or indirectly under the health authorities. The new nutrition movement is following along the idea advanced during the mouth hygiene experiment and is being given much attention. The fallacy of putting the teeth in condition without properly nourishing the body, or of trying to nourish the body without putting and keeping the oral cavity in condition, is evident. By oral cavity, we mean the opening from the lips to the epiglottis, which, of course, includes the parts affected by adenoids or diseased tonsils. The necessity of plenty of fresh air and sunshine must be insisted on.

Those results can be brought about only by cooperation and continuity of effort. If the work is endowed in a community, it will not be subjected to fluctuating conditions; but in the vast majority of cases it cannot be endowed. Those who know the value of the work must keep the community keyed up to a point where they will demand it from the administrative authorities. It should not be subjected to the vicissitudes of economic upheavals. The ultimate success depends on continuous action. It is past the experimental stage.

We are today living in a new era, brought about by increased wealth, inventions and the World War. Teaching, dentistry, medicine must be practiced in new ways. To use one of the present day catch phrases it is "law or war." If we do not prevent disease, we must fight it. It is the business of the professions to prepare a class of citizens for the coming generations that will be able to carry on.

If sufficient funds cannot be secured for full dental service, a beginning should be made by the installing of a dental hygienist. That will make an opening wedge. The people back of the mouth hygiene work should be the dentists and teachers. Too often and to too great an extent it is left to toothpaste manufacturers and dealers in dental supplies. Valuable as has been their enterprise and grateful as teachers have been for their aid, they should not bear so great a part of the burden. The direction of the mouth hygiene work in a community should be under one management, and that continued for a sufficient length of time to establish results. By so doing, some standardization of methods of procedure may be established. It is what is now much needed.

Summary

The Marion School experiment has justified itself because of the impetus it has given to the mouth hygiene movement.

The progress in medicine and dentistry

during the past twelve years has proved the claims made in every phase of the experiment.

The movement has permeated every part of the country; is rapidly being recognized as an essential in health education, and is becoming a part of the school work.

Because of our democratic institutions, the personnel of educational administration is constantly changing; hence, oral hygiene committees should not desist from continued propaganda.

Much progress has been made, but because of certain phenomena inherent in human nature, a steady campaign is necessary for the progress of the work.

For the foregoing reasons:

Endowed institutions present an admirable solution.

When such institutions cannot be had, public interest must be fostered, to the end that public funds maintain the work.

The dental hygienist is a "blessing" to the work.

The new era of civilization dawning today demands a revision of our diet habits or a war on the destruction caused by the present-day mode of living and methods of eating.

There is need of continuous work by oral hygiene committees.

Conclusion

This paper would be incomplete without a tribute to the late Dr. W. G. Ebersole. As chairman of the Oral Hygiene Committee of the National Dental Association, he with his committee members had a vision, which was carried out with such intelligent, constructive action that the value of the work is inestimable.

The machinery set up by the organization of the National Mouth Hygiene Association was admirably conceived. That it did not accomplish its purpose was due undoubtedly to the fact it was too far in advance of public thought at that time.

There is no question of Dr. Ebersole's sincerity in working toward what he saw to be a boon for humanity. To paraphrase: "There is no greater love that man can show than that he lay down his life for this cause." He certainly gave his time, his skill, even his very life for mouth hygiene work.

Discussion

L. G. Mitchell, Oklahoma City, Okla.: Miss O'Neill recognizes that America's future greatness must be, and is, dependent on the kind and degree of physical and mental training received by our children. She places their welfare above all other considerations even to the extent of openly combating those large commercial interests in which supreme selfishness is exemplified in that not even the health of the children of our land is exempt.

That the Marion school of Cleveland has kept alive the pioneer work started twleve years ago, with such a preponderance of evidence to prove its worth, speaks volumes in favor of the degree of good accomplished. These results have been achieved not so much because of hearty cooperation on the part of those from whom these workers had a right to expect such help, the rank and file of dental and medical professions and school authorities, but rather in spite of it.

Since publication of the results obtained, as given in the Marion School Report, many men in our profession have expressed disbelief in the astonishing gain made as determined by the psychologic tests. Permit me to call attention to the fact that these tests were made under the direct supervision of the school authorities and the figures published are theirs. These tests are of the same general character as used by all school authorities and governmental departments.

"League of Professions".—The professional man's obligation to society demands that he shall place the physical welfare of the people of his community above other considerations. That is to say, the actuating spirit should be in full harmony with efforts made by all others interested in health conservation and correction. Neither should the name or creed they subscribe to make any difference.

Too often have we observed not only a decided lack of this spirit of cooperation but a positive hindrance, due to a spirit that, to say the least, was not constructive. That a mani-

festation of such a spirit in the commercial world is deplorable, all will agree. What then, shall be said of those who withhold a unity-of-purpose spirit from those engaged in teaching conservation of health of human beings? "Let us therefore follow after the things which make for peace and things wherewith one may edify another" (Rom. 14:19.)

That one of the laity, a school official, should write so forcibly and intelligently on the subject of conservation of health is most gratifying; stimulating one's courage and hope that school authorities everywhere will study these problems as constructively as has Miss O'Neill.

Under the caption "Future Outlook," Miss O'Neill says our first efforts should be with the dentists themselves. Then follows a criticism for our lack of knowledge about preventive dentistry. Notwithstanding the great work already accomplished, can we, with justice to our children, resent this? Another point called to our attention, and one which has been presented at each of our national meetings for several years, is the matter of dentists refusing to render timely service for children when called on for such service. The criticism offered for this class of dentists is not too severe.

Likewise, her comment on that destructive emotion "prejudice," "viewing with suspicion and distrust any new discovery which threatens a change." How very few men,—even those of trained minds, can say truthfully, "This is not for me." Broadcasting adverse criticism of a new discovery in the realm of the healing arts, basing such criticism only on the expressed opinion of a seeming authority, without intelligent and unprejudiced investigation, cannot be too strongly condemned.

Scientific research men have, for several years, been telling us of the awful waste of human lives, in which improper diet is a primary factor. Extensive experimental work has been in progress in several cities, conducted under rigid supervision. It is extremely difficult to get this information to the laity, largely because it is in conflict with certain commercial interests. Therefore, it is deemed wise to reach the school children and their parents through channels other than the public press, or in conjunction with the press.

Miss O'Neill rightly states that education is the solution for these problems. Just how actually to reach the laity is in itself no small problem. A dozen cities have spent much time and money in carrying out experiments, covering a number of years, with most gratifying results and, having been convinced, include in their equipment and personnel full provision for making it permanent. Yet, in spite of this, many towns and even cities seem reluctant to accept these carefully worked out plans of the more progressive cities, thus making it necessary for a few earnest working, public spirited men and women, to give their time in blazing an old trail in a new place.

CLINICAL EXPERIENCES WITH ETHYLENE-OXYGEN ANESTHESIA IN DENTISTRY

By JOHN F. CHRISTIANSEN, D.D.S., Chicago, Illinois

(Read at Home Coming Alumni Clinic, Northwestern University Dental School, June 12-13, 1924)

FUNCTIONAL disturbances caused by the various gases and vapors inhaled for the purpose of producing anesthesia are most clearly manifested in the nervous system. The nervous tissues are more readily affected by anesthetics than are other body tissues. Therefore, it is said that the gases thus employed to produce anesthesia are primarily neurotoxic. It is partly due to their direct action on cell membrane, particularly of the nervous tissue, and only in part to the reduction of oxygen to the degree of imperfect oxygenation of the blood and tissue, that unconsciousness is produced.

We are informed by Professor Lillie that the effect on the nervous tissue results in some loose physico-chemical combination with the narcotic agent. Because of the changes in permeability of the cell membrane and intracellular contents, the cells are inhibited from evincing or performing their normal activities; in other words, are anesthetized. The narcotic causes the cells to become temporarily inactive and unresponsive to stimuli. This artificially induced state of inhibition, when well marked and lasting, is known as anesthesia.

Nervous tissues absorb the narcotic apparently sooner that do other body tissues, and in higher concentrations. Yet the fatty tissues compete with the nervous system in the absorption of anesthetics; a principle that is clinically demonstrable. Therefore, it seems that all these gaseous narcotics act more powerfully in emaciated subjects than in well-nourished persons.

An influential group of physiologists, headed by Verworn, maintain that the essential basis of anesthesia is "a suppression or prevention of oxidation processes." But whether the anesthetic gas has a specific toxicity for the nervous tissues or the effect is one produced by lack of oxygen to the body tissues, it appears that the symptoms shown in most gas anesthesias certainly resemble asphyxia. Perhaps it may be that asphyxia and anesthesia show additive relations to each other.

In inhalations of carbon monoxid gas, there is a chemical combination with the blood and thus an exclusion of oxygen in the body tissues. This is narcosis. Nitrous oxid is said to exclude oxygen mechanically, and thus produces anesthesia.

Want of oxygen also will produce inhibition of impulses or stimuli. It does so because, without oxygen, nerve cells cease to transmit, and nerve fibers cease to conduct, nervous impulses. Alcohol produces a like effect; i. e., causes a lessened conducting power of the nerve, but more directly affects the nerve centers.

Lack of oxygen arrests many physiologic activities that are dependent on its presence. Froelich and Heaton find that the recovery of nerves from anesthesia is imperfect or delayed in the absence of oxygen. Above requirements (19+ per cent) for functional tissue changes, oxy-

gen, it is claimed, acts as a neutral gas (as hydrogen or nitrogen). We do know that, in deficiency, inhalations of oxygen remove asphyxial factors promptly. With the additional adjustments of oxygen percentages, the asphyxial factors do not attain dangerous proportions.

With an absence of oxygen, the body functions are stopped in an almost incredibly short period. According to Barcroft[1] "by placing an organism within a measurable distance of death by oxygen starvation, it is possible to produce results which it may take days or weeks to overcome, and in elderly or unsound persons the machine may be wrecked beyond repair."

In the administration of gas anesthesia, it is therefore of importance to maintain, as nearly as possible, necessary requirements of oxygen for body functional processes. Starvation of oxygen in the tissues produces untoward symptoms rapidly: uncontrolled muscular activity and weakness, rigidity, respiratory and circulatory changes and profuse perspiration. These symptoms, of course, are general as opposed to local.

Blood reaction is intimately related to the oxidative processes. Oxygen and carbon dioxid tension are decisive factors in the blood which influence the respiratory center. Moreover, if oxygen tension is diminished abnormally in the blood, there will be an expression in respiration. But this change or expression in respiration does not become noticeable until the oxygen content of inspired air has fallen to 10 per cent or less, according to Haldane.

It is of first importance, in administration of gas anesthetics, to discover beginning changes in either respiration or circulation. Both respiration and pulse rate and volume should, of course, be constantly observed. Respiration and circulation react one on the other. Some have advised "that it is sufficient to care for the respiration alone." As a rule, changes in respiration are noted first. If the cause cannot be located in the respiration, the anesthetist should check up other signs in anesthesia. No single sign, such as pupillary reaction, color, pulse, relaxation or facial expression, may be depended on exclusively in anesthesia. For example, shallow respiration (less than normal for the patient) may indicate that the amount of the anesthetic is sufficient, or that the quantity should be reduced or lessened. The same conditions of shallow breathing may be occasioned by the extremes of anesthesia, either too light or too deep; or may be produced by insufficiency of carbon dioxid, or overdistention of the lungs, or in prolonged artificial respiration. Likewise, uneven dosage of the anesthetic may be a cause for excitement, struggling, stoppage of respiration or shock in operation.

Finally, the goal of respiration is to produce and maintain as high an oxygen (tension) pressure in the tissues and body fluids as possible.

Reaction of Patients to Gas Anesthesia

It is a well-known fact that unfavorable signs in gas anesthesia are most conspicuous early in anesthesia; i. e., during the induction period. Nervous, apprehensive subjects are always difficult to anesthetize. Healthy, vigorous persons are not always the safest risks. Much depends on the manner of taking the anesthetic, as well as the mental attitude of the subject toward anesthesia. Phlegmatic, feeble patients exhibit less tension, muscular obstruction of respiration or struggling, and also require less anesthetic. A frightened or nervous person, irrespective of type, should never be carried hurriedly into anesthesia, because the excitement of anesthesia is added to "the preanesthesia excitement, which is thus doubly enforced."

1. Barcroft, J.: Anoxaemia, Lancet 2:485 (Sept. 4) 1920.

Ideal Gas

The ideal gas has the following features:

1. It is not objectionable to the patient; is not inclined, because of its physical properties, to be obnoxious to him and, therefore, to excite him.
2. The anesthetic state is induced pleasantly.
3. The desired relaxation is effected without reducing the oxygen to an amount insufficient for proper oxygenation of blood and tissues.
4. Rapid recovery ensues without prolonged nausea, vomiting, headache or gas pains.
5. It is nonirritating to the respiratory passages; does not result in the production of a superabundance of salivary secretions or stimulate excessively the bronchial nerves.
6. It does not induce an acidosis or intensify an acidosis already present (diabetes).
7. There are no deleterious aftereffects on some tissue or organ of the body (liver, heart or kidneys).

Action of Ethylene-Oxygen

It appears that ethylene has a rapid, direct action on the central nervous system. Usually there is little if any production of intense side actions, or distinctive, accessory respiratory movements, especially in the absence of direct symptoms of asphyxia or asphyxial factors. The dilution of ethylene with high percentages of oxygen (from 10 to 20 per cent) lowers its concentration in the blood to a corresponding degree. It is nearly always possible to keep the oxygen saturation of the blood within normal limits—92 per cent. According to Leake and Hertzman, there is no effect on blood reaction beyond those that arise secondarily through the narcotizing action resulting from deranged oxygen absorption or utilization in the central nervous system.

Ethylene gas is apparently toxic to the nerve centers. In all administrations of this gas, comparatively large percentages of oxygen may, however, be used in the mixture to the production of anesthesia and the maintenance thereof. In fact, oxygen in sufficient amount to effect oxygenation of the blood and tissues (ample for metabolic body requirements) should be used with the anesthetic agent ethylene in all stages of anesthesia.

The comparatively serene condition of the patient under its influence in anesthesia and the relaxation of the musculature seem to indicate a low basal metabolic process of the tissues. The "machine" consequently endures on a minimum amount of oxygen for functional processes.

The features of ethylene-oxygen as an anesthetic, namely, quick induction with an appreciable amount of oxygen, more complete relaxation, early analgesia and absence of excitement, certainly offer advantages.

Administration of Ethylene and Oxygen

All administrations of ethylene and oxygen have been made on apparently healthy persons. Their general health on the basis of but cursory inspection seemed to be good. In a few cases, blood pressure, pulse rate and general physical appearance were recorded. There was one patient with apparent goiter, and another whose condition was indicative of great physical weakness due to infection from a compound fracture of the mandible. The patients were all of the type who present themselves to the regular clinic for minor oral surgery or for the extraction of teeth.

None of the patients were given a sedative, hypnotic or analgesic prior to the administration of ethylene and oxygen. They were not particularly selected for the demonstrations. Their ages ranged from a child of 18 months to a woman of 65 years, and a man of 74 years. They were about equally divided as to sex. The number of administrations approximated 250.

TECHNIC OF ADMINISTRATION

Position of Patient.—The patient is placed in the dental chair, and the chair tipped so as to approximate a reclining position. The head and neck are kept in line with the body, the same position as is usual for the administration of a general anesthetic in the dental office.

Apparatus.—The gas machine is set to deliver not less than 10 per cent oxygen and 90 per cent ethylene. The "bite block" or "prop" is inserted in the mouth over the molar-bicuspid teeth, opening the mouth as far as possible without discomfort to the patient.

The gas machine is now turned on to deliver the mixture as above mentioned—10 per cent oxygen and 90 per cent ethylene. The nasal inhaler is placed to make an air-tight contact with the face. During the first minute, the nasal inhaler exhaling valve is opened slightly to prevent a lung pressure in the early stage of analgesia. The mouth is covered after about six inhalations of the gas mixture. This mouth covering is so placed that no air or anesthetic mixture is permitted to enter through the mouth. Nose breathing is now established and is maintained exclusively to the end of the operation.

After the first minute, the exhaling valve of the nose piece is closed. This causes a slight pressure of our established mixture to accumulate in the bag and in the patient's lungs. The pressure thus secured produces a deep anesthesia without decreasing our safety margin of 10 per cent of oxygen or increasing the rate of flow of the mixture.

Signs of Anesthesia.—The approaching signs of anesthesia are quite different from those of nitrous oxid-oxygen. For example, there is an almost complete absence of the excitement period even in the muscular type of patient. Pupillary reaction, either of dilation or constriction, is seldom noted. The eye ball may roll or oscillate, but it generally assumes the usual anesthetic state when complete anesthesia is established.

One should remember that cyanosis of the skin means cyanosis of other body tissues. Although the mechanism of the production of cyanosis is not wholly understood, cyanosis is accepted quite generally as an evidence of partial asphyxiation, and in this sense represents a general rather than a local condition. Cyanosis, therefore, is quite generally associated with all the undesirable effects of asphyxiation; notably, rigidity, muscular activity (accessory respiratory movements), increased blood pressure and profuse perspiration. It would appear, therefore, that the ethylene-oxygen mixture produces anesthesia without any of these undesirable complications because of the abundant oxygenation of the tissues at all stages of the anesthesia, coupled with the anesthetic effect of the gas. Even in the hands of the most skilful operators, the same effects cannot uniformly be produced with nitrous oxid-oxygen without resorting to the use of nitrous oxid momentarily crowded to the point of saturation, and if necessary repeated.

Surely, partial asphyxiation is not desired in patients who are diabetic or who have an elevated blood pressure with arteriosclerosis. Ethylene-oxygen, when properly administered, need never be pushed to the point of cyanosis in order to obtain analgesia or anesthesia with complete muscular relaxation.

When the eyelids respond sluggishly to touch, the patient is ready for the mouth pack.

The Mouth Pack.—An air-tight mouth pack is essential in maintaining this type of anesthesia, in prolonged as well as brief operative periods. It is as important in nitrous oxid-oxygen anesthesia as it is in the administration of ethylene oxygen.

The main pack consists of a large roll of absorbent cotton to which a long string is firmly attached. It is rolled into the mouth over the tongue, up against the hard palate and back toward the soft palate. The sides of the cotton pack

are pushed toward the angles of the jaw and a gauze strip is laid along and over the side of cotton to prevent the cotton fibers from adhering to the instruments or fingers of the operator. This part of the technic requires only a few moments, and one is amply repaid because of its assistance in excluding air from the carefully measured anesthetic mixture. In addition, the pack in the mouth prevents blood and secretions from entering the throat and stomach of the patient—a frequent cause of postoperative nausea. It furthermore prevents accidental aspiration of roots or pieces of teeth into the trachea and bronchi. The packing of the mouth may possibly depress the mandible, necessitating its elevation to correct position.

The muscles of the mandible seemingly are not very strongly set during the anesthesia period. The mouth may be opened to rearrange the "prop" or change its position, with only a slight pull of the fingers. It seems that ethylene-oxygen is a smoother and more powerful anesthetic agent than nitrous oxid-oxygen.

Rapidity of Action.—Ethylene-oxygen is more rapid in its action than nitrous-oxid-oxygen. When the time was actually noted, our experience confirms the report of Luckhardt and Carter that anesthesia by ethylene-oxygen may be produced in considerably less time than is required for the same degree of anesthesia under nitrous oxid-oxygen.

The length of the induction period varies slightly with individual types. The phlegmatic or calm types sometimes show signs of anesthesia within thirty seconds. In fact, just three or four inhalations are frequently sufficient to produce deep analgesia. The nervous, high-strung patient may require from sixty to seventy seconds to secure the same degree of analgesia. A usual test of the sluggish eyelid, together with the relaxation of the muscles of the body, is evidence of anesthesia with all types of patients.

A marked period of analgesia is noticed as early as after twenty seconds in some patients. We have not observed pharyngeal reflexes or swallowing in this period. It seems the patient exhibits a sense of quiet and well-being. With the exception of a few cases, there has been no sign of struggling or resistance after the administration of the anesthetic was commenced. Loss of consciousness promptly intervenes. Really, there are few very definite signs by which one may note the progress towards anesthesia. In some cases, it seems that the musculature is more relaxed after a few inhalations of the ethylene-oxygen mixture than just before the anesthetic period. If the fingers of the patient were clasped prior to the induction period, they may be easily unclasped when the induction period is completed.

Respiration.—As in all types of anesthesia, respiration is our most important sign. A smooth, regular respiration of good volume and depth means good anesthesia. Apparently, under ethylene-oxygen, there is not the stimulated, labored respiration frequently observed under nitrous oxid-oxygen. It is more like the normal respiration seen in natural sleep. A slowing, shallow respiration means too deep an anesthesia. This is corrected by reducing the flow of ethylene or temporarily increasing the oxygen. In cases of anesthesia requiring more than five minutes, the oxygen flow may frequently be increased to 20 per cent or better, without producing too light an anesthesia or producing notable changes in respiration.

Blood Pressure

Observations and records of blood pressure before induction of the anesthetic, during the operative period and during the recovery period were made in a few of the clinical cases. There appeared a slight depression of blood pressure in rather deeply anesthetized patients, but no change in lighter anesthesias. Certainly, the number of tests in the clinic do not warrant definite

statements relative to variations in blood pressure.

Color of the Skin

Usually, the skin is pinkish during the anesthesia period. This brightening effect may be due to the dilation of the minute capillaries or, as has been suggested, it may mean ethylenated blood, a weak combination of ethylene with hemoglobin. The pink coloration of the skin usually remains during the anesthesia, and for a short time after recovery. In some patients, an exhilaration at recovery is apparent, but never, so far, have we had an extreme case of exhilaration, expressed in the form of forced or violent muscular movements.

Sweat Glands.—With the usual type, or favorable type, of patient, there is an absence of perspiration on the face or the forehead. The skin is dry and warm. With the muscular and anemic types, sweating has been noticed. The glands of the mouth are not stimulated excessively, according to observations.

Postoperative Effects

With ethylene oxygen, there is a very narrow margin between anesthesia and consciousness. It is interesting to note the narrow margin. Patients pass rapidly from the anesthetic to the waking stage. Several patients have answered rationally in less than two minutes after removal of the inhaling mask. A brief period may elapse before the patients regain perfect muscular control. They appear weak and rather limp, unsteady of gait, and usually need a short period of rest. Possibly, the delay of muscular control beyond the conscious period is an advantage in eliminating a postanesthetic excitement period.

Nausea—This occurs in from twelve to twenty per cent of the cases. In these cases, there is a variation of "feeling nauseated" to prolonged vomiting or emesis. The cause of vomiting is not clear. It may be from impurities in the ethylene or from the ethylene itself. There have been no serious or unduly prolonged cases of vomiting. In two reported cases, there was sickness after the patients were dismissed from the clinic.

Disadvantages

Odor.—Ethylene has not a pleasant odor. Perhaps it may be likened to ether as to its distinctive odor. No patient complained of the pungency or odor.

Oozing.—Perhaps there is more hemorrhage from the sockets of extracted teeth than under local anesthetic or nitrous oxid and oxygen. The bleeding has never been serious, and the tendency to oozing stops on removal of the anesthetic. Cases reported from other sources in which blood coagulation tests were made before, during and after administration of the anesthetic indicate no change in coagulation time owing to the presence of ethylene.

Inflammability.—Ethylene mixed with air or oxygen, in certain definite proportions, is highly explosive. Authorities assert that it is not quite as inflammable as ether vapor. No open flame or any source of electrical discharge should be permitted or used near ethylene. The operating room should always be well ventilated during administration. This point should be constantly in mind.

Freezing.—Machines are more easily frosted in the use of ethylene and oxygen than with nitrous oxid and oxygen. This is due, no doubt, to the high water content of gas in its manufacture. Ethylene is highly combustible. Therefore, electrical heaters or alcohol heaters should not be attached. If necessary, a hot water bottle or hot wet towels may be placed on the tank heads and regulators during administration.

Advantages

The advantages of ethylene-oxygen anesthesia are:

1. (*a*) The ease of induction, and the narrow margin from the anesthetic to the waking stage; (*b*) the quick recovery

(in many cases wakefulness occurs almost as soon as the mask is removed).

2. The wide margin of safety because of the high percentage of oxygen possible in the anesthetic mixture. As the anesthetic is continued beyond the induction period, oxygen may be increased to 15 or 20 per cent or more. Twenty per cent equals the amount of oxygen in the air or the normal amount of oxygen required for the physiologic body functions.

3. (*a*) Musculature relaxation quickly and surely secured without cyanosis; (*b*) absence of cyanosis.

4. Absence of respiratory irritation.

5. Absence of the marked excitement period, during induction.

6. Absence of excessive sweating—avoiding dangers from quick cooling after recovery.

7. Ease of maintenance of anesthesia.

8. Absence of postanesthesia excitement period.

9. Low percentage of nausea.

10. Absence of postoperative disturbances, such as loss of appetite, headache and sleeplessness.

Report of Cases

Case 1.—An 18 months-old child was brought to the clinic for the extraction of two upper central teeth. The child was frightened and crying. The induction period lasted about one and one-half minutes, (ethylene 100, oxygen 18). The patient was under full anesthesia. Immediate recovery ensued. The child was kept under observation for about one hour. It was a matter of a very few minutes before the child was sitting up on the bed playing. There was no nausea and no ill result.

Case 2.—A youth, aged 19, came in for the extraction of two molar roots. The general color of the patient was pale and pasty. He was in a typical anemic and malnourished condition, and was a little slow in succumbing to the anesthetic. Recovery required about one minute. After a brief rest, the patient was able to leave the clinic without showing any ill-effects.

Case 3.—A man, aged 74, apparently active in his daily life, had ten teeth extracted under ethylene-oxygen. He took the anesthetic slowly but smoothly. No excitement stage was observed, and he felt no weakness whatever from the moment of recovery.

Case 4.—A butcher, aged 33, height 5 feet 9 inches, weight 265 pounds, underwent an extraoral operation. Ethylene-oxygen was administered slowly. The pulse remained normal, and there was no cyanosis. No excitement was observed during administration. The induction period was two minutes, and deep anesthesia lasted about fifteen minutes. The anesthetic was discontinued and straight oxygen was given to observe recovery period. A noticeable postoperative excitement period lasted only a few moments.

Case 5.—A woman, aged 32, who had eaten no lunch or breakfast, had five teeth extracted (3:15 p. m.). She had been under a physician's care for six years continuously for neuritis, and the physician now concluded that the trouble might be due to the condition of the teeth. The patient stated that she had undergone an operation six years previously, possibly a hysterectomy. Thyroidectomy had been performed nine years previously. She was extremely nervous at that time.

The pulse was feeble before anesthesia was started. There was better volume, though with acceleration, as ethylene-oxygen was administered. Slight cyanosis was noted, and the skin was moist and clammy. Abdominal respiration was present. There was flushing and the pulse was thready. Change in color of the finger nails was noted throughout anesthesia: pale—red—cyanotic. Oxygen was increased as follows: 10-28-22 (25 during a short period), during anesthesia. After the operation was completed, and the mask was removed, the eyes were set; the pupils were dilated, then constricted to the size of a pinpoint, and there was muscular twitching periodically. The respiration was shallow. The pulse was fast and feeble. The patient was seemingly in a state of coma for about one half hour. Spirits of ammonia was administered by inhalation with the result that eyes became more set, and the patient entered a state of coma. After recovery, she was nauseated, with emesis of bloody liquid. She complained of headache. One-half hour after recovery, she was able to walk, but had very little strength. Emesis occurred after she had been standing on her feet for some time. She left the clinic at 5 p. m.

Her physician reports that the patient is under his observation weekly, for neuritis, and, to his knowledge, there is no reason why she should not be able to take ethylene as well as any other patient.

NORMAL AND ABNORMAL DENTOFACIAL DEVELOPMENT

By B. E. LISCHER, D.M.D., St. Louis, Missouri

(Read before the Chicago Dental Society, Chicago, Illinois, January 17-19, 1924)

WHEN an individual enters the cycle of changes we term life, he is destined to an advancement which we designate "normal development." This capacity to grow is a distinctive feature of living organisms and, under favorable circumstances, implies a perfect balance of function, form and structure.

When the seed from which an organism springs, when the nourishment that sustains it, or when the environment in which it matures, contains injurious factors, yet permits continuation of life, abnormal development occurs. This irregular growth is revealed in functional disturbances and structural lesions.

The modern sciences of bacteriology and pathology, of biochemistry and physiology endeavor to describe the specific chemical, functional and structural changes from the normal found in diseases and affections. As specialists in oral pathology, we have assumed the definite task of critically examining the structural and functional deviations in our domain.

Dentofacial deformities constitute a group of abnormalities that measurably restrict the functions of the oral cavity; often impair articulate speech, and not infrequently mar the facial configuration.

Importance of Full Functional Activity of Teeth in Childhood

In comparative studies of the human head, it has been found that the main diameters at birth and maturity average as follows: (1) fronto-occipital, at birth, 11.75 cm., at maturity, 18 cm.; (2) bregma-occipital, at birth, 9.5 cm., at maturity, 14.5 cm.; (3) mento-occipital, at birth, 13.5 cm., at maturity, 22.5 cm. It is worth noting that, in the fronto-occipital and bregma-occipital, the increase recorded equals 6.25 and 5 cm., respectively; while in the mento-occipital, the gain amounts to 9 cm. This greater increase in the latter diameter is due to the tremendous growth of the lower half of the face, in which dentition and the consequent development of the jaws are important factors.

Geyer has observed that by drawing a horizontal line through the pupils of a normally developed adult European face, we divide the head into two equal parts; and if we apply this line to the face at birth, we note that the portion falling below the line is considerably shorter than the cranial, or upper, portion.

In a series of drawings, Welker has shown the proportional growth of the morphologic face, which increases from a ratio of 42 per cent at birth and continues to the twenty-fifth year, or the completion of the permanent dentition.

In his "Dental Surgery," Tomes long ago pointed out that "the forms and dimensions of the crowns of the teeth are unalterably fixed long before the jaws are sufficiently enlarged to admit their ultimate arrangement, so that the forming teeth and their crypts have to be packed by overlapping one another."

Among the factors of accommodation which make the ultimate normal arrangement possible, we note, particularly:

(1) external subperiosteal growth of the jaws; (2) their growth, or elongation, backward; (3) normal influences of the tongue, and of the muscles of the cheeks and lips, and (4) the fact that the diameters of bicuspids are smaller than those of temporary molars (Hunter). The development of the maxilla and its forward and downward movement have been described by Keith, Zsigmondy and others. Keith has emphasized the expansion of the maxillary antrum, which consists of only a slight depression at birth, as a factor in maxillary growth. The development of the mandible has been discussed by Tomes, Looss and other writers, at great length.

The growth of the jaws is undoubtedly influenced by the presence and use of the teeth, because in cases of their congenital absence, or very early loss, and consequent loss of function, arrest of development is always very marked. The same is true in cases of bony ankylosis of the mandible, when this occurs before development is completed. Hence, we conclude that the teeth of growing children should be maintained in a state of health and full functional activity, to insure vigorous, normal dentofacial development.

Anomalies of Dentition

As dentists, we are concerned with the anomalies of dentition and those modifications of the facial features that are causally related to them. For convenience we may classify these as (a) malposition of the teeth; (b) malrelation of the dental arches; (c) malformation of the jaws and their processes; and (d) malformation of the facial lines.

Malposition is very common and any, or all, of the teeth may be involved. The temporary, as well as the permanent, teeth may be malposed, but permanent incisors, cuspids and bicuspids are most frequently affected. These take the places of temporary predecessors and generally meet with interferences. Such deviations are readily recognized in the anterior maxillary teeth, but are frequently overlooked in the corresponding mandibular teeth, probably because of the smaller size of the latter.

The alveolar process surrounding malposed teeth is habitually arrested in its development because socket formation is dependent on tooth position. In other words, the teeth it supports must have normal anatomic relations, if it is to reach the maximum development. And since the period of tooth eruption is the period of greatest growth in the alveolar process, it is desirable to undertake all the required corrective measures at this time.

But we rarely find malposition in one arch without a compensating deviation in the teeth of the opposite arch. And when several teeth are malposed and thus come into abnormal occlusal contact, we almost invariably observe an abnormal form of the dental arches. Hence, it is seldom possible to correct malalinement of the teeth in one arch without changing the form of the other.

An examination of the teeth of only one arch, for the detection of oral deformity, is always a faulty procedure and usually leads to an incorrect diagnosis. The occlusal interdependence of the units of a human denture is one of the finest examples of adaptation and bilateral symmetry to be found in the whole realm of organic life. We must not overlook the possibility, therefore, of a bilateral, or unilateral, as well as a mesial, or distal, malrelation of the dental arches. Indeed, the placement of an entire arch on its bony base, even though it appears symmetrical in form, may be abnormal. For this reason, the terms bilateral and unilateral mesioclusion and bilateral and unilateral distoclusion, have come into common use in dental orthopedics.

The classification of oral deformities for diagnostic purposes has led to a critical study of each group, and this has so increased our knowledge of their

maldevelopment that every form may now be diagnosed in its earliest stages. Formerly, it was customary to postpone most treatments until all of the permanent teeth had erupted; for it was universally believed that Nature, or the processes of growth, would assist in the correction of the malocclusion. Many bitter disappointments have taught us the error of such advice. Oral deformities do not develop over night; on the contrary, most forms are of slow growth. Hence, it follows that years before even an intelligent parent recognizes the impending deformity, the alert diagnostician can advise ways and means for its prevention and correction.

The experiences of many practitioners have forced us to a keener appreciation of the "golden age" for treatment, by which we mean that time in an individual's life when the change from the temporary to the permanent dentition occurs. This covers the period from 6 to 14 years of age. In rare instances, it has been found advisable to begin treatment prior to the sixth year, particularly if a tendency toward extreme malformation of the jaws asserts itself. The size and form of the jaws beyond the immediate alveoli may be involved to such an extent that the occlusal aberrations of the teeth are of secondary importance. Thus far, we have failed to develop diagnostic methods with which we can accurately determine the magnitude of jaw deformities, but orthodontists fully comprehend the difficulties their correction entails and constantly urge early treatment.

Modification of Facial Features

Every human face presents lineaments of character which stamp it with individuality and, under normal conditions, the features frequently combine in a manner so harmonious that they reveal a striking symmetry. It is "actually a very wonderful and animated piece of architecture, full of beauty and inspiration for one who looks upon it with a seeing eye and considers its age-long evolution with a comprehending and sympathetic mind."

In a general way, the size and form of the head and face are largely conditioned by the size and form of the bony structures to which the soft, outer parts are attached. Nevertheless, there are numerous variations of these external features which are not related to the osseous frame. Briefly, we note variations in the length of the lips and in their contour when viewed in profile; differences of their mucous membranes, and the variations in the length of the oral fissure.

For the purpose of analyzing the modifications of the involved facial features, we may outline them as follows: (a) malrelation of the lips; (b) malfunction of the lips; (c) malformation of the lips; (d) modification of the symphysis.

Malposition of the anterior teeth frequently causes an abnormal relation of the lips without functional disturbances or malformation of their structure. In such instances, the correction of the dental malocclusion usually establishes a normal facial expression. When the dental malposition is of an extreme form, or when it is complicated by nasal obstruction and mouth breathing, the function of the lips becomes abnormal. If these disturbances are permitted to exist over a prolonged period of time, alteration of structure follows. Restoration of the dental occlusion and normal lip function should always be instituted during the developmental period and completed prior to the fourteenth year; otherwise, the structural alterations and faulty habits of the lips will persist through life.

Modifications of the symphysis usually involve the bony structure of the mandible; hence, their correction should also be undertaken at an early age before the permanent denture is fully established. The restoration of normal function during the developmental period is a fundamental principle of rational treatment.

THE INCIDENCE OF PULPLESS TEETH*

By RUSSELL L. HADEN, M.D., Kansas City, Missouri

THERE seems no doubt that small areas of infection, in themselves symptomless, may give rise to serious metastatic disease. How important a rôle chronic foci of infection play in the causation of disease is, however, as yet undecided by the majority of clinicians. In studying the problem, one wishes to know, among other things, just how frequently chronic foci of infection occur.

It is difficult to determine with any degree of accuracy the incidence of all chronic foci of infection. For instance, it is often hard to decide whether a given tonsil is infected or not. The teeth, however, can be quite satisfactorily studied from the standpoint of frequency of infection by the use of roentgenograms.

Several studies have been made of the frequency of dental infection in those suffering from chronic disease. The opinion is quite unanimous that the incidence of chronic foci of infection is very high in such patients. Thus, Irons[1] found that 44 per cent of 124 patients had alveolar abscesses. This author noted that 76 per cent of those with arthritis, 47 per cent with nephritis, 23 per cent with gastro-intestinal trouble and 25 per cent with cardio vascular disease had periapical infection. Irons also found that 36 per cent of forty-seven patients suffering from iritis, as seen in private practice, had alveolar abscesses. Langstroth[2] found that 84 per cent of hospital patients with gastric ulcer, 66 per cent with acute arthritis, 73 per cent with chronic arthritis and 100 per cent with gall-bladder infection were suffering also from chronic focal infection. Of 150 patients seen in office practice by Moorehead[3] 69 per cent had alveolar abscesses. This author found dental infection in 89 per cent of 332 patients with arthritis. The very much higher incidence of dental infection in those with systemic infection than in those showing no systemic disease is emphasized by the findings in 100 patients I have recently reported in connection with a study of the differential leukocyte count.[4] One hundred per cent of forty-seven patients with disease of focal origin had pulpless teeth and 77 per cent had periapical areas of rarefied bone; of 53 patients with no disease of focal origin, only 47 per cent had pulpless teeth and 32 per cent had one or more teeth showing rarefaction of bone at the apex.

Such figures as have been quoted above show very conclusively the high incidence

*From the Department of Medical Research, Deaner Institute.

1. Irons, E. E.: J.A.M.A., 67:851, 1916.

2. Langstroth, L.: Am. J. M. Sc., 155:232 (Feb.) 1918.

3. Moorehead, F. B.: J.A.M.A., 67:845, 1916.

4. Haden, R. L.: Differential Leukocyte Count in Chronic Periapical Dental Infection, J.A.D.A., 10:596 (July) 1923.

of periapical dental infection in patients with chronic disease. In estimating the general importance of periapical dental infection, one wishes to know just how frequently such infections occur in people as a whole. Black[5] studied 6,000 dental films from 600 individuals in this connection. An endeavor was made to select the subjects so as to afford a cross section of "people as met on the street." Black found an average of 1.4 alveolar abscesses or radiolucent periapical areas for each mouth. It is a striking fact that this figure was approximately the same in all age intervals from 20 to over 50. The number of patients with pyorrhea or periodontoclasia varied, however, from 13 per cent in those from 20 to 24 to 88 per cent in those over 50 years of age.

Black noted only the incidence of alveolar abscesses and pyorrhea or periodontoclasia. Pulpless teeth that are apparently negative in the roentgenogram may often harbor a sufficient number of bacteria to be a factor in systemic disease. I have recently cultured quantitatively 370 such teeth in deep tubes of glucose-brain-broth-agar. A summary of the results shows that 42 per cent of this number had more than ten colonies of bacteria for each tube and 20 per cent had more than 100 colonies. A similar study of 278 teeth with periapical radiolucent areas showed 61 per cent with ten or more colonies and 45 per cent with 100 or more colonies. It is apparent from these figures that apparently negative teeth showing no evidence of periapical bone rarefaction in the roentgenogram should be considered almost as seriously as possible foci of infection as those showing the definite bone absorption incident to abscess formation. What one wishes to know then is the incidence of all pulpless teeth.

To determine in a statistical way the occurrence of pulpless teeth, I have studied 7,000 dental films from 500 patients including adults of all ages. Those selected represent a true cross section of patients as they present themselves at a pay dental clinic. The results are tabulated in the accompanying table. The average number of pulpless teeth for each mouth is 3.9, the average number of periapical areas of bone rarefaction (the so-called alveolar abscess) for each mouth is 1.5. Ninety-one per cent of the 500 patients had pulpless teeth and 68 per cent had definite roentgenographic evidence of periapical disease. The average number of missing teeth for each mouth was 6.4.

These figures emphasize again the widespread occurrence of periapical dental infection. In view of the well established relationship of focal infection to certain systemic diseases, the need for more careful search and eradication of chronic foci of infection cannot be too strongly emphasized. Special emphasis should be laid on pulpless teeth that are apparently negative in the roentgenogram as possible foci of infection in the presence of systemic disease of manifest focal origin.

INCIDENCE OF PULPLESS TEETH AND PERIAPICAL INFECTION

Number of patients	500 (7,000 films)
Patients with pulpless teeth	91%
Patients with periapical rarefaction	68%
Average number of pulpless teeth for each mouth	3.9
Average number of areas of rarefied bone for each mouth	1.5
Average number of missing teeth for each mouth	6.4

5. Black, A. D.: J.A.M.A., 71:1279, (Oct. 19) 1918.

EXTRACTION OF TEETH, WITH SPECIAL REFERENCE TO COOPERATION BETWEEN EXODONTIST AND GENERAL PRACTITIONER*

By BOYD S. GARDNER, D.D.S., Rochester, Minnesota

(Read at a meeting of the Minnesota State Dental Society, St. Paul, February 12-15, 1924)

BEFORE the day of artificial dentures, teeth were removed only to relieve toothache, but as the art of replacing teeth developed, many good teeth were sacrificed in order to facilitate this type of work. Today, we realize that teeth are extracted for still other reasons. The infected tooth, even without any manifestation of tooth pain or tooth discomfort, is a factor in disease and has become a health problem. It therefore behooves dentists to acquaint themselves with the general systemic condition of their patients, and either equip their offices to take care of patients, or make more use of hospitals.

The public appreciates the marked progress that dentistry has made, but the technic of extracting teeth without reference to the anesthetic, as generally practiced by the average dentist today, is not sufficiently different from the manner in which teeth were removed by the barber surgeon centuries ago for the lay public to appreciate any great advancement. Generally speaking, extraction is still a chair proposition, and the aim is simply to get the tooth out.

We realize that the surgical manipulations of the dentist in the removal of teeth are just as much a part of general surgery as the work done on the nose, throat, ear or eye. Accordingly, we should at least attempt to copy the principles that have made general surgery a success, and lay special emphasis on asepsis. The demands made by the public account largely for the progress made in dentistry, and are due to the fact that today the public is receiving, through the press and educational institutions, information pertaining to medicine and dentistry that formerly was unavailable. Therefore, it would seem wise to do our part to encourage the members of our dental societies to prepare themselves better for the responsibilities of their work.

Dentists can profit by comparing their operations with those performed by the general surgeon. We know that, before any operation, the first considerations are the patient's systemic condition and the surgical risk. Fatalities charged to dental surgery are, no doubt, due to the anesthetic, to operating at an inopportune time, to too many extractions at one time or to lack of asepsis. Even if the exact cause of death is not known, the mortality emphasizes the fact that cooperation between dentist and physician is to the patient's interest. After any death

*From the Section on Dental Surgery, Mayo Clinic.

following dental surgery, certain questions should be asked and answered: Would the patient be alive had a competent physician been consulted, or if not so many teeth had been extracted at one time? If a local instead of a general anesthetic had been used, or vice versa, would the result have been different? Were the technic employed and the chain of asepsis what they should be? Until we face conditions as they actually exist, we cannot hope to gain the recognition from the medical profession for which we are striving.

Nitrous oxid can, no doubt, be safely administered to a large percentage of people. Statistics in regard to its safety are often quoted, making reference to such men as Colter, Thomas and other early users of this anesthetic. However, it should be remembered that, in the early years, the anesthetic was given for a few seconds or sometimes minutes, and not continued during the operation; quite unlike the technic of today, in which oxygen is combined with the nitrous oxid in order to maintain the anesthesia longer. It is regrettable that the dental profession is not enlightened through the different dental publications with regard to the exact conditions surrounding fatalities. We should be able to learn by the misfortunes of others as well as by our own. Perhaps the dentist, like the surgeon, has at times quoted the statistics of other members of his profession in regard to results of extraction by a certain technic or the use of a certain anesthetic. The patient, no doubt, is interested in such data, but what he really wants to know is how successful that technic will be in your hands.

Many dentists are limiting their practice to the extraction of teeth and to dental diagnosis, the number having increased during the last few years. Today, especially in larger cities, many extractions are being made by the specialist, and the relationship between the dental practitioner and these men who have been especially trained is in many respects not what it should be. For example, we are often informed of the unpleasant problem of the exodontist in attempting to please the dentist who has made the reference. Refer cards marked for the extraction of certain teeth often indicate, in addition, the fee, the anesthetic and the technic of extraction to be employed, and even go so far as to inform the specialist that a roentgen-ray examination is not necessary. Yet the patient has been referred for the best service than can be rendered, and the responsibility passed to another. It is obvious that if anyone carried out such directions, he must admit that he is nothing more than a servant to the general practitioner, whose good will he considers it necessary to keep. It would seem, therefore, that members of this society should recognize conditions as they really exist, and make an effort to enlighten the public and impress on them the reason for the reference. The exodontist should be free to render the best service possible, and to name a fee based on the service rendered, plus the nature and difficulties of the case, as well as the means of the patient. Fees based on the number of teeth extracted certainly do not meet with the approval of the public, and so long as this means of determining fees continues, the public will consider the work on a commodity basis. The number of gallstones removed in performing a cholecystostomy is never a factor in determining the fee. The extraction of half a dozen teeth affected with pyorrhea is much simpler than the extraction of one lower first molar or bicuspid, yet the fee for the

former may have been far greater than for the latter. This method of determining fees no doubt accounts for the opposition when a just fee is asked for the extraction of an impacted, or otherwise difficult tooth. In the mind of the average patient, it is simply one tooth, and the difficulties the operator meets in its removal and the necessary postoperative treatment are not considered.

A very definite line can be drawn between the surgery used in extracting teeth and that part of dentistry that deals with fillings, bridges, plates and so forth. A similar comparison can be drawn between the work of amputating a leg and that of making and fitting an artificial one. There should be but one grade of surgery in both cases, the best the operator can deliver; whereas, the kind of plate or the kind of artificial leg depends, at least to some extent, on the ability of the patient to pay. The general surgeon operating on patients in different walks of life gives the same care, and the same operating room service; but, unfortunately, there has been a tendency on the part of certain dentists to vary their surgical services according to the means of the patient. An operation may be performed by an exodontist in an operating room of a hospital, where every link in the chain of asepsis is complete; yet a similar operation might be performed the same day by the same dentist, in his office, without the same consideration for the patient that was accorded the patient at the hospital. The inconsistency of such procedures only tends to prevent dental surgery from receiving just recognition.

In undergraduate teaching, especially, more attention has been paid to the extracted specimen than to the condition of the process and of the other teeth. In other words, the welfare of the patient has been neglected. The patient cares little about the extracted tooth or teeth; but he is interested in the condition of the process and the teeth that are left, the postoperative pain and the time required before his plate or bridge can be tolerated.

No doubt the early work of Shearer,[1] Novitsky,[2] Blum,[3] Lucas,[3] Molt[3] and many others was done primarily to eliminate the pathologic conditions. However, the refinement of the original operation has brought out many important points. Adjoining teeth are respected; all of the affected tooth is removed; trauma is minimized; postoperative pain and hemorrhage are reduced to a minimum, and tissues are left in such a condition that early repair results. Progress has been made, as we are now able actually to see conditions at the time of operation. As operators, we are as good as the results we obtain; and when the discouraging percentages with regard to retention of roots, pathologic conditions, impactions and so forth were discovered, the importance of the routine postoperative roentgen-ray examination was emphasized. Not only is the operator able to see that the entire tooth is removed, but he has an opportunity to determine whether his technic has injured adjoining teeth. Especially is this important in operating on lower third molars, if impacted, when every precaution should be taken not to injure the second molar. There appears to be every reason for the dentist to become ultra-enthusiastic when he performs his first open-view operation, as often this is his first opportunity really to see the pathologic conditions, and to note the difference in the anatomic structures. It is regrettable that the dental student in his course in anatomy is required to dissect practically the entire body except the field for which he is responsible.

1. Shearer, W. L.: External Alveolectomy, J.N.D.A. 7:499-504, (June) 1920.

2. Novitsky, J.: Dead Teeth, Dental Summary 39:426-432, 1919.

3. Personal communication to the author.

OPERATIVE CARE OF CHILDREN'S TEETH

By WILLIAM H. LEAK, D.D.S., New York, New York

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

Prevention by Cleanliness

TWO factors exist relative to prevention of dental or mouth diseases.

Cleanliness of the mouth has long been looked on as of great value. Diet also has been recognized as a factor. During the last few years careful laboratory experiments pertaining to various diets have been conducted, and we owe much to these investigators.

Foods do affect the development of the teeth. The best illustration of this exists in the mottled enamel found in people in certain districts, a subject which has received careful study from Frederick McKay. There has not yet, however, been produced sufficient evidence to show that dietary changes may alter the enamel after its formation. In fact, McKay's findings seem to indicate the opposite. The effects of diet on dental diseases are certainly much overstated when a prominent author says that the whole subject of mouth hygiene in the past has been misdirected. The work of D. D. Smith and Alfred Fones is too self-evident, in not only preventing tooth decay, but also periodontoclasia or even simple inflammation or congestion of the gingiva mucosa and in the establishment of hygienic mouth conditions.

In our modern diet we are perhaps deficient in calcium contents and excessive in the consumption of sugar. The people of America have a varied diet, and it is difficult for me to believe that we do not in one form or another receive quite as complete food values as our grandfathers or the North American Indians did; or as good as the Eskimos and some other living tribes who are reported as being free from dental decay.

A review of the literature found in the "Dental News Letter," published in the forties, leaves little doubt that our great grandparents had serious dental afflictions. The physical character of the foods of dental decay-immune persons is likely harder and tougher than our own, requiring much mastication, resulting in the strengthening of the alveolus and surrounding membranes, teeth well embedded, an active flow of the saliva, mechanical protection and cleansing of the teeth. This is borne out somewhat by findings in the teeth of the North American Indians, who were not as immune to dental decay as is so often stated. Teeth of Indians of northern sections show little decay, while teeth of the southern Indians show that decay was more frequent, owing, perhaps, to the less resistive character of the foods of the Southern Indians. Our foods of today require little mastication. Our teeth are more elongated, owing to lack of development of the alveolus and surrounding membranes, thus giving opportunity for lodgment of food in approximal spaces, and resulting in tooth decay and gum irritations. There is little attrition on the occlusal surfaces, and this results in fissure cavities. Then, added to this, the excessive sugar consumed today, causes active fermentation, owing to all this, it seems that artificial cleansing of the mouth is most essential. We

have been teaching the use of more fibrous foods and more mastication, with good results. However, it is natural to take the easy way, and while people may learn the value of mastication, the fact is, they may select the softer foods.

I know no phrase which has done more for good teeth than "A clean tooth never decays." Sometimes we may feel that mouth hygiene is making little progress. During the last two years I have been particularly impressed with the large number of children coming to me in private practice with beautiful mouths. Children who have had intelligent home care in all respects show the results of their home mouth care most apparently. Seldom do I find a child in pain, and most of them are free from serious dental defects.

Fig. 1.—Brushing lower left.

Fig. 2.—Brushing upper left.

Fig. 3.—Brushing lower right.

Fig. 4.—Brushing upper right.

Again, it has been my good fortune to assist in the establishment of dental care in some of the day nurseries in New York City. The results of teach-

ing these little tots to brush their teeth are evident in less decay of the teeth. Their mouths are much different from those I found when examining in July and August, 1921, 741 preschool age children.

Thaddeus P. Hyatt and others have shown that approximately three-fourths of dental decay occurs on the masticating surfaces. We have been offering different methods for the proper brushing of the teeth, but have generally failed to instruct in the manner of brushing the chewing surfaces. With deciduous teeth, these surfaces are the most important to brush. As the teeth, when they erupt, are short, it is the only place to brush. The brushing should be hard and vigorous in all directions, but mainly back and forth. Little children cannot properly brush their own teeth, and should have the brushing done for them. In brushing teeth for children, the brush may hurt the child, resulting in his objecting to the brushing and preventing proper brushing. For this reason I offer to you a method I have devised for the proper manipulation of the brush in the child's mouth by the governess or parent, as shown in Figures 1, 2, 3 and 4.

Briefly, the method consists of the child's head being held between the left arm and body of the governess with the forefinger placed in the mouth. The cheek which is opposite the teeth to be brushed is held back. The other fingers of the left hand rest on the child's chin. The brush is held in the right hand with the thumb and two first fingers. The third finger of the right hand is brought in contact with the second or third fingers of the left hand as the brush reaches the distal part of the last molar. Thus the brush cannot injure the mouth in any way.

Prevention by Operative Procedure

Freely granting that all decay cannot be prevented by combined efforts through nutrition and cleansing, frequent examinations of the mouth are necessary to note conditions which favor decay.

I wish to remind you of the great depth to which fissures may and often do extend, as seen in Figure 5, which shows a histological specimen of a permanent tooth. It is my firm belief that good nutrition and health during the formative period of teeth will result in

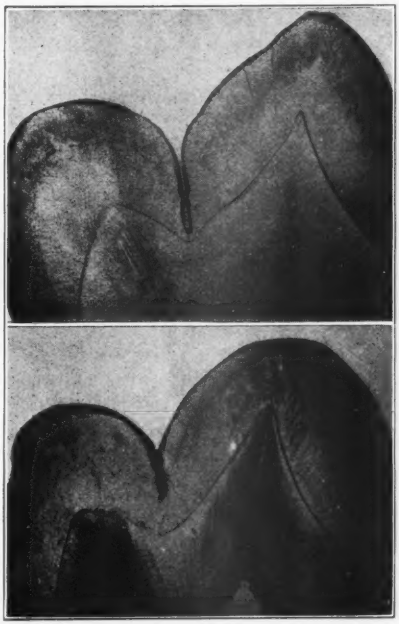

Fig. 5.—*Above,* a deep, open groove; *below,* a shallow groove.

shallow fissures and those less likely to decay. The same applies as well, but more noticeably, to the deciduous teeth. In the deciduous molars it is not infrequent to find them free of fissures with smooth, rounded depressions between the cusps.

Thorough mastication will do much to prevent the lodgment of food debris in shallow fissures and prevent decay. Where chewing is active, the masticating surfaces of the deciduous teeth become

much worn, and small fissures are obliterated. Silver nitrate is the agent to which we have resorted for many years in the checking of decay. Its use has been universal for many years and its value is undisputable. My method of applying silver nitrate is by melting a little of it in a small loop of a platinum wire and rubbing this over the wet tooth surfaces, after which the mouth is immediately well sprayed.

The use, or I might say the misuse of silver nitrate I consider to be very dangerous. Much is being claimed for it which is questionable. When decay has once definitely started in the fissures, it should be removed mechanically by instrumentation. Decay of the deciduous teeth usually, because of the high organic composition of the dentin, penetrates deeper than is generally considered. In the removal of decay the operator will always do well to question himself in regard to the complete removal of the decay. When an explorer or other fine instrument will catch in the fissures of the deciduous teeth, it is well to use a bur. In these cases the use of silver nitrate becomes dangerous. Too much dependence is placed on it, and decay cannot be stopped. It has been my experience to find fissures where only a slight catch of an explorer is possible, but on opening up the tooth to find the decay extending dangerously close to the pulp. In such cases silver nitrate is without value.

I would sound another warning in the use of silver nitrate. In cases where decay is known to extend close to the pulp or definitely to it, or where a leathery or even harder layer of infected dentin lies over the pulp and where the removal of it would mean exposure of the pulp, silver nitrate should be used most discreetly. Strong solutions for the briefest period are likely to penetrate to the pulp and prove disastrous. Even light solutions should be quickly neutralized. It is highly caustic and may affect the pulp. For like reason all caustic preparations should be avoided when they are likely to come in contact with vital pulp. It is my firm belief that greater credence is being attributed to silver nitrate than its value assures. Surely, we should view with alarm the teaching that its use will supplant the dental engine and that burs are unnecessary in modern technic.

Personally, I do not use silver nitrate in deep-seated cavities of either the deciduous or permanent teeth. My method is to saturate them with Dakin's solution for a few minutes or to seal them in until a subsequent sitting. This is followed by using or placing a thin layer of eugenol or formagen, or, if I am virtually almost in touch with the pulp, I use a mixture of pure zinc oxid, glycerin and eugenol. Over any of these I place a copper cement.

In the consideration of children's teeth, it is difficult not to include the first permanent molars. The fissures in these teeth may not be safely disposed of by the simple application of silver nitrate. The recognition of this fact is what likely prompted Thaddeus P. Hyatt to introduce the advisability of filling the sulci of all first permanent molars.

Fissures of the first permanent molars may exist and cause no harm. It is not uncommon to find many adults with rather deep fissures into which a sharp explorer will lodge and catch and in which decay does not take place. With such patients that I see frequently, every three months or so, I may or may not use silver nitrate, but I do not open into such fissures with a bur, unless I am quite sure that decay has started. With those who are irregular in their visits to the office and for clinic patients, I advise the opening of the fissures and filling where there is a definite catch of the explorer. While there is so much definite demand for our services, both in private practice and in clinics, I believe it wrong to open all fissures.

Hyatt seems to resent that part of Kirk's editorial, in which he compared

Hyatt's "Prophylactic Odontotomy" to the former practice of grinding the approximal surfaces and creating spaces between the teeth. I pay tribute to

Fig. 6.—Apparently simple cavities; enamel undermined, and decay close to pulp.

Robert Arthur. He recognized conditions which were daily before him. His error was in the too heroic application of his treatment. I mention this, to emphasize the advisability of carefully polishing all approximal surfaces. With all children I instruct the parents or governess to bring the child within a week after the loss of the second deciduous molars, in order that I may well polish the mesial surface of the first permanent molars, which usually presents a peculiar roughness and which is the cause of much decay on these surfaces. I agree with Arthur in giving attention to the approximal surfaces, and with Hyatt in placing fillings in fissures, but deviate from both because their methods were too drastic.

Filling and Treating Teeth

In reference to cavities found in teeth, I shall confine myself to three different classes.

The first class is apparently simple cavities, as shown in Figure 6. To attempt to excavate cavities such as these with a few scoops of a spoon excavator or briefly with a round bur with a touch of an inverted cone bur to secure retention will usually result in failure. In cavities of this type, free use of sharp chisels are required in order to break down the undermined enamel. This is followed by the removal of the decay, which will approach close to the pulp. After removal of the decay, the cavity is sterilized with Dakin's solution. It is then painted with varnish and oxyphosphate is placed in it. When decay is well removed, cavities should always be coated with varnish to prevent caustic action from cement.

In the molar tooth, retention should be secured for the filling by extending the cavity occlusally and enlarging the occlusal pit. In the placing of either a gold inlay or an amalgam filling, the metal should be very thin in order to prevent thermal shocks to the pulp. Figure 7 illustrates how retention may be secured in a cavity of this type.

Fig. 7.—Cavities in molars.

The cuspid presents the more difficult problem, since the cavity is on the distal surface, and the filling placed should be well contoured. In cavities of this kind the enamel of the tooth beneath the

Fig. 8.—Cavities in cuspids.

cavity should be removed. Retention for a gold inlay in these cavities is secured by cutting a groove on the lingual surface, as shown in Figure 8. This groove I would cut out with a fissure bur, and I frankly admit that is a difficult procedure. Retention for an amalgam filling is secured in much the same way as shown in Figure 9. However, in this case the groove on the lingual surface is more easily made. I usually use a small-sized knife-edged carborundum disc or stone, followed by a fissure bur and an inverted cone bur. With the amalgam filling the walls do not need to be kept parallel and, in fact, are better not so.

It has been my experience that it is well to avoid grooves under the enamel on the labial or lingual surfaces for the

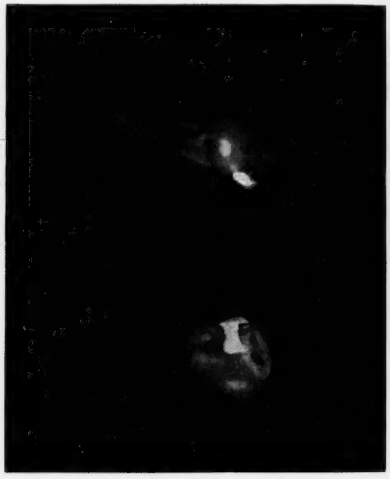

Fig. 9.—Retention for an amalgam filling in a cuspid.

retention of amalgam fillings, and this has led me to adopt this step variety of retention for metallic fillings in the deciduous teeth.

The second class of decay is that causing much of the occlusal surfaces to become affected, as shown in Figure 10. The exposed surfaces are often hard in places, and the bite is such that the affected surfaces are frequently in occlusion with the teeth of the opposite jaw, and are polished by mastication.

Decay in these teeth sometimes does not extend deeply. Again, only one small point will be found to extend

deeply, or there may be more of such places extending deeply. These I consider each as separate cavities. Assuming that they do not extend to the pulp, decay is removed from each. If space permits, they are given linings of varnish and oxyphosphate and amalgam on top. Perhaps it may be possible to connect two or more places and with sufficient retention to warrant the placing of a thin veneer of amalgam over the whole surface. Again it may not be practical to so connect these. In such cases and in

Fig. 10.—Decay affecting occlusal surfaces.

cases presenting none of these deep points, I paint the surface with silver nitrate and then polish the surface with stones. When finished the surfaces may not be flat but present depressions, but each of them will be well polished. If the bite permits, and the decay has been well removed and the retention of a filling seems very difficult, I do not hesitate to place on a crown. I look on this as not only preserving the tooth, but also as aiding to maintain the correct positions of the teeth.

The third type of cavities, shown in Figure 11, are those cavities which, while not large on the exterior, do extend deeply and involve the pulp. My observations prompt me to say that many such teeth are treated with silver nitrate and many others have only the superficial decay removed and fillings placed in them. Nothing of value is accomplished by either of these procedures. Proper examination of these teeth show that the pulp is so involved that it will not remain alive.

This brings us, then, to the consideration of pulpless deciduous teeth. Primarily, because of an experience in supervising the care of the teeth of more than

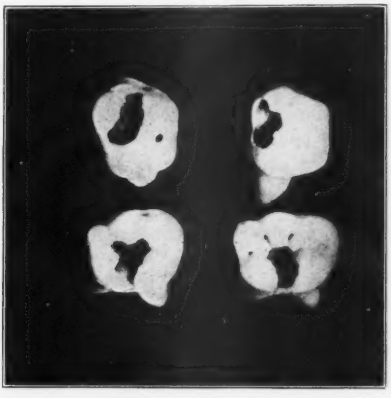

Fig. 11.—Cavities small on exterior, but extending deeply and involving pulp.

300 children for the New York County chapter of the American Red Cross, I have come to a very definite view on this subject. The children referred to were all carefully selected by medical men as being undernourished and 10 per cent or more under weight. The children received every physical and medical attention practicable. In the dental work I made it a rule that all teeth with pulps involved should be extracted. Our nurses looked on this with delight, for the children were all weighed and measured every week, and almost invariably two weeks after the extraction of pulpless teeth the children gained in weight.

My policy in reference to deciduous

pulpless teeth is this: In private practice with patients whom I see frequently, at least every three months, and where the child is healthy, I may treat and endeavor to save the pulpless teeth, but even then, only with the definite understanding that, in case the child becomes sick, I am to be notified. With all other patients in private practice I advise the extraction of deciduous pulpless teeth. And my advice to clinic patients is the same as for those in private practice.

Naturally, as dentists, we regret to see teeth extracted. May I repeat here what I have frequently stated before: Just as long as the dental profession assures the public that teeth sadly neglected, which is the cause of most teeth having pulps involved, can be saved, just so long will the public be negligent and continue to have pulpless teeth. When the dental profession warns the public of the imminent dangers which may result from infections from pulpless teeth, and that such teeth when retained in the mouth may be the source of infection, then the public will give more consideration to the necessity of the care of the teeth and the prevention of large cavities.

Purpose of Presentation

One of the great reasons, doubtless, for the neglect of the deciduous teeth and the indifference of the dental profession in giving them proper care and attention is that normally they are shed at 12 years of age and replaced by the second set. But to consider them temporary and to treat them so is equal to considering life itself temporary and, therefore, failing to care for and protect it.

All of the purposes for which the second set of teeth are intended apply equally or with even greater importance to the first set of teeth, and since the child has a smaller number of teeth, each tooth is proportionately of greater value. All of the diseases to which the second teeth are subject also affect the first set. And in all the serious ways by which the second teeth may affect the health, the first teeth likewise may affect the health of the child. Because of the greater needs of the child for growth and development, and of its susceptibility to physical derangements and diseases, I have no hestitancy in stating that the deciduous teeth are of greater value to the child than the permanent teeth are to the adult for equal periods of time.

My one purpose in presenting this paper is to encourage more profound interests among dentists in the care of deciduous teeth. I do not want to call attention merely to the care of children's teeth, but to stimulate far greater efforts in the *proper* and the best attainable results.

The character of the decay in deciduous teeth, usually approaching closely to the pulp, the organic nature of the dentin, the frailty of the tooth substance, the large bell shape of the teeth and the closeness of the pulp to the enamel make the excavating of the decay and the placing of a proper filling very difficult. There has been a great deal of temporizing done in the treatment of the deciduous teeth. There is great need for more study to find means of saving the deciduous teeth. There are many very skilful operators and men of experience who are not filling deciduous teeth. May I urge on you to give this question more careful consideration. May you think again before referring the little folk to a less experienced operator whom you may have in your office. I invite the most skilful to attend personally to the children. It is work calling for the highest degree of operative skill and experience. It is a reflection on our good name as dentists that expert work is not being done for the deciduous teeth.

Discussion

Haidee Weeks Guthrie, New Orleans, Louisiana: Cleanliness and diet we will all agree are of value. Cleanliness unquestionably is of value. For example, in my own clinic work, fifty children in a day nursery, between

the ages of 2 and 4 years, were selected, instructed how to use the brush, and were seen periodically for two years. At the end of that time there was not a cavity in one of the fifty mouths.

As to diet in relation to teeth: In my mind that should be given a symposium of its own. How can we account for the normal and abnormal conditions existing in the mouths of children in the same family? How can we account for the normal and abnormal conditions existing in the mouths of twins? The same foods are prepared for the children in the same family. The food for the twins is the same, and yet one twin will have a mouth predisposed to caries and the other a mouth immune to caries. Let us go farther than diet. We have the function and the lack of function of the endocrines to study. We see, so far as I have been able to tabulate, more susceptible mouth conditions due to a hypothyroid condition than to any other endocrine disturbance. The hypothyroid condition is usually accompanied by viscous, mucous saliva, and a marked lack of the sense of taste, or, rather, the differential sense of taste. When I examine a patient, whether it be a child or adult, I see whether he can differentiate taste. I use an acid, salt, quinin and sugar. The majority of the children under nine will not be able to differentiate between an extreme acid and quinin. Acids are bitter to them and quinin is bitter also. I will not go into that any further. That is something I am working on in my clinic.

I do not believe that three-fourths of the dental decay occurs on the occlusal surfaces of the teeth. It may by some operators be found there, but I believe that in the deciduous teeth we find more decay on the approximal surfaces, particularly the distal of the lower first deciduous molar.

My method of brushing the teeth should be to place the bristles of the brush parallel with the long axis of the teeth, between the cheek and the gums; on the upper teeth brush down, and on the lower teeth brush up. The occlusal surfaces are brushed mesially and distally, buccally and lingually. This can easily be done to the tune of "Yankee Doodle."

The first visit of any patient, big or little, rich or poor, to my office or clinic must be accompanied by his toothbrush for a lesson in the use of the brush. I make him show me how he has used his brush, and then by the use of a mirror which the patient holds, I show him how he has neglected certain parts of his mouth which he has failed to reach, and correct the brushing by a toothbrush drill.

I quite agree with Dr. Leak in the use and misuse of silver nitrate. I do not use it at all in permanent teeth under any consideration. I would like to ask Dr. Leak how much higher the organic composition of the deciduous teeth is than that in the dentin of the permanent teeth. In removing the leathery decay, we often hear a little squeal, and see a drop of blood. We know what has been done. An exposure of the pulp has been made. One drop of phenol and the pain subsides. We seal it at once with gutta percha and dismiss the patient with instructions to return in four weeks. My rule has been that if a tooth cannot be filled it must be extracted; but I do not extract all pulpless teeth in either the deciduous or the permanent denture. Tooth environment and the health of the patient determines the procedure. There are two exceptions: the child with proved tubercular glands, and the child with pyelitis, who should have all pulpless teeth removed.

An excellent idea that Dr. Leak has brought out is that he requires the parent to bring the child to him within a week after the loss of the second deciduous molar, in order that the mesial surface of the first permanent molar may be polished. May I make a plea here that if there is a cavity on the mesial surface of the first molar, we bring the cavity preparation to the occlusal, making it a mesioclussal filling.

Dr. Leak says that his purpose in presenting his paper was to encourage more profound interest among dentists in the care of deciduous teeth. Let me add to that. If you want to get joy and happiness out of your work, start a clinic in a settlement neighborhood. Study the children and their families. Sociologic problems will arise that you never dreamed could exist in this civilized enlightened world of ours. It will make you thankful that you are living in your sphere and encourage you in right living. Give the child his chance. You start your own clinic. Give the best you have to them, to those not so fortunate as you and, as Dr. Prothero once quoted to us:

> "Life is a mirror of Kings and slaves,
> It is as you are and do,
> Give to the world the best you have
> And the best will come back to you."

Philip R. Thomas, Minneapolis, Minnesota: It has been said that cleanliness is next to godliness. If this applies also to mouth cleanliness, then a tremendous percentage of our people are wandering far afield. Some apparently clean teeth do decay but you will note the "apparently". There can be no question about the influence of diet in the developmental stage of teeth. No proof is necessary to establish this fact as it is a matter of daily clinical observation. It is true in relation to the development of both the deciduous as well

as the permanant teeth. The diet as well as the physical condition of the parents has a direct effect on the structure of the deciduous teeth. The condition of the mother in her freedom from the cachectic diseases and her diet during and previous to pregnancy may be said to be the all-important factors in intrauterine tooth development. These influences of course are persistent during the nursing period if the child is breast-fed. If the bottle is the source of sustenance, the physical disability of the mother as transmitted to her offspring still exerts a malign influence, and about 60 per cent of bottle-fed babies suffer from malnutrition.

The parent stock largely determines the health and development of the race. We cannot but agree with Dr. Leak in his comments on modern foods. The fact remains that people eat what it is possible to buy on the market in the form in which it is presented to them. It is a self-evident fact that we have digressed far from eating habits of our forefathers both in speed of consumption and in the selection of foods. Do you think that these things can be nationally changed? Take white bread for instance. Almost every "cliff dweller" buys his bread from the baker. The source of the bread supply of the urban population is the baker. We know that this is a nation of bread eaters and it will take years to change this condition. Might we not, to the present advantage of people, teach them that while white bread has a large food value, its deficiencies may be overcome by adding other foods to the diet, thus supplementing their diet with necessary food requisites?

Local conditions in the East must be very different from those in the West, for in my own practice, children from the best families in the matter of home care, as well as expert medical supervision, show a marked divergence from the normal in regard to the development of the osseous structure of the mouth. I would consider this a serious defect in spite of the absence of caries. Children today are suffering more from lack of function in development than from habits of childhood tending to inhibit development. Maintenance of normal tooth structure, as well as function necessary to development, is based on mastication. Mastication and function in relation to development can be induced by feeding children foods in as dry a form as possible, and requiring thorough mastication before it is possible to swallow. Prehension is becoming one of the lost arts. This loss is registered in the easier incidence of tooth-destroying processes in later life.

Concerning the use of nitrate of silver, in dilute solution it acts as an astringent on mucous membranes and on raw surfaces by precipitating albumin of the cells, and in concentrated solutions or crystal form it acts as a nonirritating caustic. The prevailing opinion is that its penetration is limited on account of the impenetrable nature of the coagulum formed. In weak solutions it is active as a disinfectant. The long-continued use even when locally applied (to soft tissues) might result in a condition called argyria, a bluish grey discoloration of the skin. There is little danger of producing argyria in dental practice. The immediate application of a saline solution to the part is a positive antidote. Common table salt applied immediately to a soft tissue touched by the caustic clears up the discoloration, as it forms with the drug an inert silver chlorid. In my opinion the use of silver nitrate is very valuable in desensitizing carious matter before its removal and is invaluable in the arrest of caries in deciduous incisors which cannot be filled but which it is necessary to preserve on account of function. Its use should not displace the necessity for fillings, but in many cavities impossible to excavate on account of pulp exposure, a capping of nitrate of silver with suitable material will preserve the vitality of the pulp by sterilizing the infected dentin. In my experience the application of silver nitrate to a wet tooth is contraindicated. The tooth should be dried before the application is made. A convenient method of applying silver nitrate is a follows: After the tooth is dried with an applicator, a 10 per cent solution of nitrate of silver is applied. Powdered amalgam is dusted on the part of the tooth to be stained and the action of the silver nitrate is almost instantaneous. The tooth being isolated, we have never as yet had any untoward results from the use of silver nitrate. The handling of infected deciduous teeth in the mouths of children of more than 7 years of age need not be the subject of heated discussion. According to G. V. Black, little success follows the attempt to fill either absorbed roots of teeth or partially developed roots. By the seventh year, lateral areas of the mouth anterior to the first permanent molar are developed, except in the cuspid region. The loss of the deciduous four or five is not a serious matter in relation to development if the space is maintained following the extraction. Previous to this time a more marked result of the loss of teeth is noted and our problem in the conservation of teeth is more difficult. There is and always will be a healthy difference of opinion relative to the treatment of infected teeth. Some of the profession save them in whatever condition that may or will be in, irrespective of the result to the patient. Some others advocate treatment and retreatment when a fistula appears, attaching no importance, apparently,

to the presence of large areas of infection about the roots. Others take the surgeon's point of view and believe in the removal of the tooth and the clearing up of the infection by drainage and curettage if necessary. Personally, the latter is the course of procedure followed in practice, stressing the necessity of space maintenance to the time of bicuspid eruption.

It would not appear necessary to enter into an extended discussion of "Prophylactic Odontotomy," as suggested by Hyatt and referred to by Dr. Leak. Most deep fissures in the first permanent molars are easily susceptible to caries. Whether it were better to excavate all fissures in the newly erupted first permanent molars or to protect them and later prepare cavities for permanent fillings when children are more tractable must be determined by conditions surrounding the case. The protective cements if applied to the occlusal surfaces of molars serve to disclose conditions necessitating attention. If the fissures are not deep, the cement will all wash away, and thus give evidence that the tooth surface is self-cleansing. Where the cement is retained in the fissures, it may determine the necessity for its removal and replacement with a permanent restoration. A very good point brought out in Dr. Leak's paper is the fact that when the deciduous five is shed, it gives an opportunity for polishing the mesial surfaces of the first permanent molars, before the bicuspids erupt. Most mesial surfaces of first permanent molars are impaired on account of the difference in the contact surface of the deciduous tooth and the contact point of the mesial of the first permanent molar failing to make a self-cleansing contact.

C. R. Barnes, Lawrenceville, Oklahoma: I would like to know something about these space maintainers.

Dr. Leak (closing): With reference to the question just asked: That is a subject outside of my paper and was referred to by Dr. Thomas. However, space retainers are sometimes difficult of application, especially if you have extracted the second deciduous molar prior to the time of the eruption of the first permanent molar. It is difficult then to put in a space retainer, but after the first permanent molar has erupted, if either of the deciduous molars are then extracted, it is quite an easy matter to place a band upon the first molar and a gold bar extending from that to one of the other teeth, with sometimes simply a rest upon the other tooth and sometimes a band about it.

We do need a great deal of care for the deciduous teeth. I am speaking now of the little child so young that he cannot properly brush his own teeth. Dr. Guthrie was referring to the little child in the clinic, 4, 5, and 6 years of age, who can sing a little ditty and brush his teeth, and that is admirable. Children 4 years of age should brush their own teeth, but little children 2 years of age cannot brush their teeth themselves. They should have their teeth brushed for them. That is the time we should start to think about the children. Personally, I am thinking about them. When I learn that the mother of the family is expecting another child, I want to be in touch with that mother right away, to see that proper care is being given to her, and that when the child comes, she is given definite instructions relative to the care of that infant. I want the chance to see that that little child who has just come into the world is one of my patients. I want to be kept in touch with that child, from that time on. At 2 years of age I want the child in the office, with the parent, to instruct them how to brush the teeth. Dr. Guthrie says that she has them bring a toothbrush with them. That is good, but I have the kind of a brush that I think they ought to use. I give to them the brush with which I have taught them.

Dr. Guthrie asked me about the composition of the dentin. I am not a histologist and I cannot answer her in definite terms, but I do know that the dentin of the deciduous teeth has a much higher organic composition than has the dentin of the permanent teeth. I believe that Dr. Guthrie also knows this from her operative experience. It is only from my operative experience that I make that statement. I believe our histologists will bear me out in it.

Dr. Thomas referred to changes in food. I believe that we can change the food and I believe in the last five years, that we have very greatly changed the food of the American people. I believe more people are eating green vegetables today than they did five years ago. There is a difference in the foods that the poor people on the East and West sides in New York receive and the foods that are consumed by the better classes of people of New York City, yet the social workers of New York City down in these poorer sections have taught so much about green vegetables that these people, too, are changing their diet and they are trying to get better foods; they are eating more spinach, more carrots and more oranges. They are changing their food habits. Dr. Fones told me some little time ago that white flour bread is not used nearly as much in Bridgeport as it is in other cities, and that the whole wheat bread is purchasable in most of the stores.

PREVENTION OF DISEASES AND CONDITIONS THAT MAY RESULT IN DESTRUCTION OF THE HARD STRUCTURES OF THE TEETH

By RUTH M. CONWAY, D.D.S., Detroit, Michigan

(Read before the American Dental Association, Cleveland, Ohio, September 10-14, 1923)

THE factors that produce a destruction of the enamel, dentin and cementum are (1) dental caries, (2) erosion, (3) abrasion and (4) root-end absorption. Of these four factors, dental caries has received the greatest amount of attention and study because it is the most prevalent and most devastating in its effects. The prevention and control of dental caries is our most effective means of practicing preventive dentistry.

The research work of Dr. W. D. Miller proved conclusively that micro-organisms are a factor in the production of dental caries. Results of his work have been verified by clinical experience in both clinics and private practice so that there can no longer be a question in anyone's mind that one of the simplest ways of practicing preventive dentistry is to combat the bacteria in the mouth.

That there are other factors involved we do not question. Among these, we may mention calcium metabolism, endocrinology, diet and other phases of hygiene; but these are more obscure and less easily approached. So it seems good judgment to deal with a condition which we *can* control to a considerable degree. In the meantime, other factors may be discovered which will aid in combating dental caries.

One very practical measure is to change the environment of the teeth by reducing the quantity of organisms present in the mouth. This is accomplished not by antiseptics but through mechanical measures in the hands of both patient and operator. The patient *can* keep his teeth clean if he has been properly instructed and educated to the value of so doing. In keeping his teeth clean, he has reduced the number of bacteria by changing their mediums. He has reduced the food supply of those remaining until it is practically depleted and the most enthusiastic bacterium becomes discouraged and vacates his apartment in the mouth. With the food supply removed, the power of the invading organism is weakened.

To accomplish this change in environment of the teeth, it becomes necessary to recognize various handicaps which patients may have to a greater or less degree.

The number of bacteria together with their destructive processes, fermentation and putrefaction will be greatly reduced if food particles, the substances on which they grow, are eliminated from around

the teeth very shortly after each meal. These food particles, if left in the mouth will be fed on by bacteria and result in coating or films after from six to eight hours. The frequent breaking up of the bacterial coatings on the tooth surfaces dilutes the acid formed by these bacteria and prohibits its concentration at one point.

The resistance in any tissue depends in a measure on its development; therefore, if we can improve the quality of the tissue during its developmental period, it will be better able to resist disease. Calcification begins the fourth month of fetal life and sufficient calcium and phosphorus should be supplied through the system of the mother by means of foods, otherwise they will be extracted from the mother's reserve, which may result in disaster to both mother and child. The calcium to be provided for this calcification process must be derived first from the system of the mother and later from milk and other calcium-bearing foods consumed by the infant and growing child. After the birth, the mother should partake of a diet high in calcium and phosphorus. Dr. H. C. Sherman says calcium and phosphorus metabolism go hand in hand and one is useless without the other. It would seem to be the duty of the dentist to give to the mother a list of those foods rich in calcium and phosphorus, this list to be indorsed by the patient's physician. These foods should be incorporated in her diet during lactation. Dr. R. W. Bunting, through his experiments conducted for the Research Institute of the National Dental Association and published in 1917, concluded that the amount of calcium in the saliva bears the most direct relation to the condition of teeth and their susceptibility to caries. Dr. Bunting suggests that two methods may be employed in an attempt to raise the calcium content of the saliva: (1) medication locally, and (2) ingestion of foods high in calcium, systemically.

We should instruct patients in special care of most susceptible areas. These are:

1. Occlusal surface of molars, especially first and third, due to time of eruption; first, end of jaw of temporary, third, end of jaw of permanent teeth. Last tooth in mouth, neglected.

2. Proximal surfaces: (a) overlapping teeth, difficult to reach; (b) those where opposing marginal ridges are different heights. The food packs down and is retained against the tooth surface.

3. Buccal surfaces: (a) upper third molars, last tooth, neglected; (b) buccal pit of lower first molars, due to retention of food in pit; (c) distobuccal of lower third molars and last tooth neglected.

4. Occlusal pits of bicuspids; especially lower bicuspids.

5. Cervical areas: Brush not used close enough to gingiva either through carelessness or fear of injury to gingival tissue.

6. Lingual pits under cingulum of upper centrals and laterals, deep and difficult of access; often patient not aware of them.

7. Surfaces of newly erupted teeth: Through position out of occlusion; gum flap; harder to care for.

8. Hypoplastic teeth: Deep pits difficult to reach.

Dr. Thâddeus P. Hyatt, in a series of statistics which he has published, gives the first molar areas in order of their susceptibility. He says the occlusal is more than twice as susceptible as all others; then the buccal, mesial, distal and lingual.

Dr. H. B. Butler of the United States Public Health Service, after a study of 1,000 cavities in first molars states that occlusal cavities are seven times as frequent as all other cavities together.

One very successful method of preserving newly erupted posterior teeth is to be found in the use of silver nitrate and cement. The pits and fissures of these teeth as soon as exposed to view may be dried off and sterilized by the precipitation of silver in them through reduction of silver nitrate and then covered with a thin layer of cement allowed to flow into each crevice to protect against future accumulation of decalcifying acids. This cement will dissolve out in time and must be renewed at intervals.

A change in our diet may bring about a decrease in susceptibilty to dental caries. We should avoid the use of adherent foods and all those which result in a viscous, highly mucinous saliva. Dr. W. J. Gies states that "nothing makes saliva as thick, as mucinous, as adhesive as sugar"; and he says "Abundance of sugar accounts for much of progress and apparent cumulative increase of dental caries among civilized peoples, for sugar not only makes saliva thick and favors formation of mucin plaques but it also provides a suitable pabulum for localized bacterial production of acid." When candy is eaten before retiring, it has been found beneficial to drink plenty of water with it, thus diluting the saliva and reducing its viscosity to nearly normal.

The dentist should put the mouth in as nearly a state of health as possible and the teeth in a condition in which they may be most easily cared for by the patient himself, so that health may be maintained. It is our right, under some circumstances, to demand new restorations, made with an improved technic, to restore a proper and easily cleansed contact point. We should remove and polish overhanging and rough edges of fillings. We should make opposing marginal ridges the same heights.

The most effective means of breaking up bacterial coatings, removing mucinous plaques and rendering the mouth as clean and as free from foreign matter as possible consists in painstaking personal care of the mouth by the patient, which should at intervals be supplemented by oral prophylaxis at the hands of the dentist or dental hygienist.

Smooth, polished tooth surfaces are of advantage to both the patient and the dentist. It is easier for the patient to produce satisfactory results when he attempts to clean his teeth and saves time for the dentist or hygienist at any subsequent sittings for treatment. This polishing may be done with orangewood sticks or rubber cups charged with powder.

Some effectual method of tooth brushing should be taught the patient. It matters not so much which of the accepted technics is employed so long as the patient gets results. The teeth should be kept clean and the periodontal tissues stimulated. It is up to the dentist to make the patient realize that he must produce results by his own personal effort. The occlusal and proximal plaques must be frequently disturbed. Those on proximal surfaces can best be reached in most mouths by the use of dental floss. It is advisable to brush the teeth after each meal, but this is not always practicable. The two most important times for brushing are after breakfast and after the last meal of the day. If the dentist inquires of his patients just when they brush their teeth, he will invariably find that it is before breakfast, seldom after. If the teeth are

brushed, as they should be, after the last meal the night before, this before-breakfast brushing is unnecessary, since there will be no food particles to remove then. But after-breakfast brushing is very necessary to remove the breakfast particles before they change form. If a dentifrice is used, it should be known by the dentist to be a safe, noninjurious one.

After one has finished using a toothbrush to cleanse the mouth, there are still, in a complete set of teeth, sixty-four surfaces that have not yet been reached. These are the proximal surfaces and can most easily be cleansed by the use of a flat ribbon dental floss. Care must be exercised in the use of this dental tape; otherwise, great injury can be done the interproximal gingiva with it. One should hold it with only a short space between the fingers to hold the tape tense and have absolute control over its use. It should be allowed to slide gently through the contact point with a light sawing motion and then both proximal surfaces of the embrasure should be rubbed, extreme care being exercised to avoid injury to the gingival septums. One should keep in mind not so much the removal of particles of food from between the teeth as the rubbing off and polishing away of tiny microscopic plaques that may adhere to these surfaces, especially just beyond the contact point. Here capillary action and mucinous débris result in a salivary stasis that is conducive to a localized production of acid. Tape is also indispensable in the care of a fixed bridge.

The first rôle of the dentist is that of operator; he puts the mouth in a state of health. The second rôle is that of instructor; he teaches the patient the personal care of the mouth. The third, we might term that of executor; i. e., he must have frequent enough supervision over the patient to see that his instructions are executed. We must point out to the patient each place where he has failed; show him that place with a mouth mirror; explain just how he can best reach that spot, and then insist on its being reached.

Another condition that is very destructive to the hard structures of the teeth is erosion. There are at least eight different theories to account for this condition. Most scientists agree that the active agent of erosion is probably an acid, the source of which is the point on which they disagree.

What means shall we take to destroy or neutralize this acid in the mouth? At night, when there is a salivary stasis, the acid may be most concentrated and get in its most destructive action. It has been recommended that we advise a solution of sodium bicarbonate or milk of magnesia as a mouth wash or spread on the teeth and between the teeth soda or other alkaline substances to neutralize the acid. These may keep the mouth alkaline for several hours, but the value of this is questionable.

The subject of erosion lends itself as a big field for future research. It has been neglected in our zeal to obtain a true understanding of the commoner and more destructive disease, dental caries.

Abrasion is another destructive force that may produce serious consequences. Perhaps the commonest form is that caused by occlusal trauma. Continuous overstress gradually wears away the enamel of the crown, and is even known to wear the whole of the crown down to the gingiva.

Our most effective means of preventing a large percentage of abrasion is to gain as nearly as possible a normal occlusion; through the work of the orthodontist; through raising the bite; through

grinding of offending cusps, or through placement of bridges to restore occlusion and retain spaces to prevent tipping of teeth. Grinding of cusps to correct occlusion should never be attempted without great care and a definite knowledge of the results we are striving for. It is advisable to make plaster models to study the occlusion and determine the points of overstress. These points may be marked on the model and used as guides for grinding. We can also be guided by the facets formed on the teeth and by the use of carbon paper. Thus, we grind the offending points, no others. In abrasion due to brushing, a brush of medium bristles and a known safe abrasive should be employed. Crosswise force should never be used in brushing. Clasps and plates should be so constructed as to prevent the abrasion of the teeth on which they encroach. We should watch abraded areas closely, for they are often the only signs to indicate a traumatic occlusion that is a precursor of periodontoclasia.

Root-end absorption is a destructive process which occurs at the apex of the root or occasionally along its sides. It is due to an irritation, which in turn sets up an increased blood supply, which activates the osteoclasts. Osteoclasts break down the bony structure of the root. Absorption may be caused by a pulpless tooth with an abscess; by encroachment of an impacted tooth on another root, or by traumatic occlusion. It may be prevented by skilful root-canal operations on pulpless teeth; by removal of impacted teeth exerting a pressure on a root-end, and by relieving occlusal trauma. Roentgenography is our only means of diagnosing root-end absorption.

The prevention of these four conditions, dental caries, erosion, abrasion and root-end absorption, is not a fantastic dream but a reality so largely possible of attainment that it is worthy of your consideration. It can be and is being put into practice daily in the offices of many dentists through a thorough and painstaking application of just such measure or measures similar to those described. No dentist who will conscientiously apply the principles of preventive dentistry in his daily practice can fail to be impressed with and become enthusiastic over the results obtained.

STUDY OF AN ABRAMS DEMONSTRATION

By WESTON A. PRICE, M.S., D.D.S., F.A.C.D., Cleveland, Ohio

THE following is a report of a study made of an instrument that was brought to me by the presumable owner, which, he stated, was a set each of the Abrams Diagnostic and Treatment Units, with the request that I investigate the instrument and his method of applying it, he having assured me that he had complete confidence in it. Knowing of the criticism of the instrument, he desired to leave it to my findings as to whether he was correct in his interpretations as to what the machine would do in his hands. He assured me that he would let my findings determine whether he should continue its use in the examination for and treatment of disease.

Dr. Blank and his assistant, who is his subject, arrived with the instrument on the afternoon of Tuesday, March 4, 1924. He selected a back room which could be darkened and which had water pipes conveniently near, where there would be maximum freedom from the contaminating influence of bottled pathologic specimens or sources of bacterial culture and bottled chemicals.

The diagnostic instruments were set up on a glass-top table, the plateglass of which was approximately three-quarters inch in thickness. Attachments were made to water pipes by placing the wires under the screw of the faucet, and wires were continuous metallic circuits from the instruments they were grounding, either by being continuous wires or by soft soldering. The subject, a man about 30 years of age, stood, with his shoes on, on a rubber mat (the subject is not the patient but is part of the examining equipment), and the examiner sat in a chair with his shoes removed and his feet on large zinc plates, which were grounded to the water main. To increase the conductivity of the water main, the water was turned on in it, at the request of the examiner. Great care was taken to see that all binding posts and plug contacts were making good contacts to insure perfect electrical connection. The instrument was thoroughly tested out by the examiner who was demonstrating it, to make sure that both the instruments and his subject were in perfect working conditions.

The first series of studies was made at night when there was a minimum of disturbance and distraction from outside the room. It was demonstrated to us that the subject must stand facing exactly due west. Otherwise, correct readings would not be possible. This was accomplished by means of a compass. The compass, however, was found to be in error, owing to the presence of a magnet, used for sterilizing various fields, which was lying in close proximity to the compass. It was explained that the adjustments of the instrument were so sensitive that all of these conditions, such as magnetic direction, must be observed.

The demonstrator requested me in ad-

vance to have ready for him samples of blood from cases to be diagnosed. The first used was that from a patient, aged 39, who had been severely crippled with arthritis and who had been greatly relieved by removal of dental infection, but was physically incapacitated because of extreme muscle atrophy resulting from anterior poliomyelitis (infantile paralysis), which she had suffered in childhood. We had assured her that this muscle atrophy would not now be subject to treatment. She reported to me, however, that she had been assured of great improvement if she would submit to treatment with the Abrams method by a local operator (not the demonstrator), and also advised me that she had paid more than $200 for the treatment, without apparent improvement. A reading was started on the blood from this case but was discontinued when the operator found that it had been in a room in which there was a milligram of radium, and in its place the reading was made from a sheet of filter paper on which she had been requested to write her name with a pencil with a metallic frame. An Eversharp, furnished by the demonstrator, was used. At the time the above-mentioned sample of blood was taken, two other samples prepared in the same way were left on a lower floor of the building and were used later for making diagnoses.

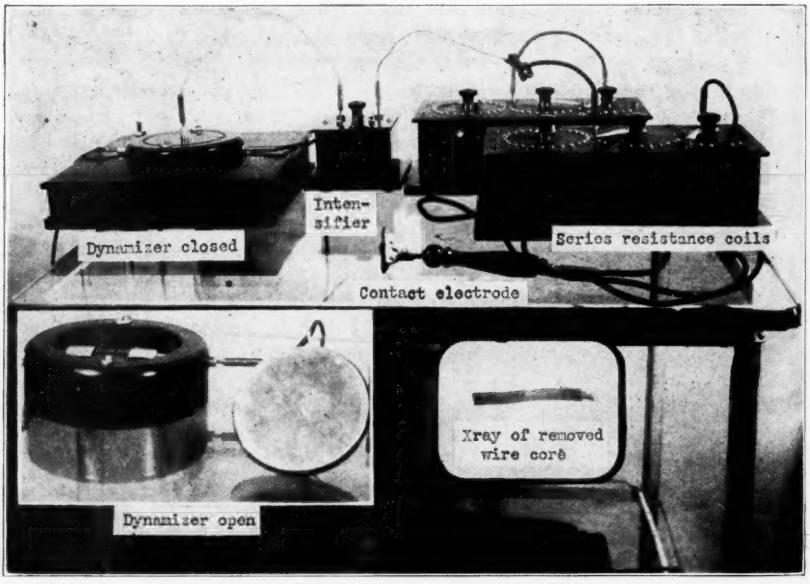

Fig. 1.—Diagnostic Unit, Abrams.

A demonstration was made to show that the results were entirely different whether or not the subject faced some direction other than due west.

All of the blood preparations that we had in readiness for the tests had to be discarded because it was found by the

demonstrator that the paper had been torn from a hemoglobin test book, which had a test chart in the front of it, showing the different shades of red, colors which were considered adequate to spoil completely our blood specimens, which had been made with great care and with much expenditure of effort, particularly in the preparation of the imitation bloods. This change in program necessitated some overtime work in preparation for the following day's studies.

In order to remove, as completely as possible, the danger of my making wrong interpretations, I arranged to have from two to four assistants present practically at all times, an expert professor of physics part of the time, and both a physiologist and a clinical and tissue pathologist most of the time.

Details of Procedure

For the information of those not familiar with the detailed procedure required for making an examination, the following is a brief description. The specimen of blood, consisting of one medium size or, better, a large drop, soaked and dried into a piece of blotting or filter paper, or any white absorbent paper, is placed in the instrument called a "dynamizer," which is shown both with the top off and on, in Figure 1. Inside the dynamizer will be seen two electrodes, which were attached to grounds extending to the water main. This dynamizer is connected to a box whose measurements were about 4 inches. This box, which is called an "intensifier," is also shown in Figure 1. These two units are connected by a metallic wire, which passes through the lid of the dynamizer to an insulated metallic disk lying in close proximity to the piece of paper containing the blood. This is shown in the insert "Dynamizer open," Figure 1. The intensifier is in turn connected by a metallic circuit, as shown in Figure 1, to the rheostat of the diagnostic unit, which consists of three units of variable resistance, one said to contain 50 ohms, another 10, and the third fractions of an ohm by division into twenty-fifths. (Two rheostats were used in series part of the time, as shown in Figure 1.) This instrument was connected through a single wire to the contact electrode, also shown in Figure 1, which was held in the hand of the subject, and in most of the procedures of the diagnosis, held by him against his forehead. This subject was clothed so that his body was exposed over the region of his chest and abdomen. The examiner or demonstrator sat on a chair, as stated, with his stocking feet on the grounded zincs, and was without connection with either the instrument or the subject except as the wires, passing from the instrument to the subject's hand, passed across his neck, which was not part of the connection though it could become a means of conscious or unconscious recognition of the completion of movements on the part of the subject. It is not my opinion that this was used at all as a means of communication.

The procedure consists in placing the paper containing the drop of blood, folded or unfolded, under the cover of the dynamizer; but before doing so, the dynamizer and its cover and the specimen of paper were each sterilized by making passes in front of them with a magnet. The top was then placed over the dynamizer.

Each disease is represented by a definite zone on the surface of the abdomen, not at all related to the organs in which the disease would occur. The cancer area, for example, is just to the right of the subject's navel, which is at the demonstrator's left as he faces him. The syphilis area is just above it; the streptococcus area at the left of the subject's navel. A large number of diseases

have their expression within a very small circumference around the navel.

The examiner placed his left hand on the bare surface of the abdomen and tapped with the second finger of his right hand on the second finger of his left hand. As he did so, there was always a dull note at the beginning. After from ten to twenty taps, the pitch of this tone sometimes raised, this constituting a positive diagnosis. The diagnosis was negative if the pitch of this tone remained constant. Having determined that any particular disease was present, its location could be established with considerable exactness, as will be shown presently. Since the percussing is done in many of the same or overlapping areas, the different diseases are distinguished by setting the rheostat so that a given number of ohms will be in series; as, for example, 32 for streptococcus, 50 for cancer, 57 for syphilis. Having determined that there was a disease somewhere in the body, let us say cancer, the location of the cancer was determined by placing on the subject's head an elastic band carrying a contact, to which there was an extension, a single cable, insulated cord, to a handpiece ending in a point, which point was directed toward but not necessarily against, the surface of the body. If the tones came up strong when the point was pointing toward the gallbladder it indicated that the cancer was in the gallbladder; and similarly, other areas.

The severity of the affection was determined by measuring the fractions of an ohm on a scale which divided the same circuit into presumably twenty-five equal divisions, and the number of twenty-fifths of an ohm beyond the 50, say, for cancer, at which the tone came up best, determined the severity of the cancer. This point is important to remember in connection with the later part of this report.

A set of standards had been provided and were presented by the demonstrator, against which to check various affections or types of culture. These were in the form of bottles (Fig. 2) of about 2-ounce capacity, and were labeled "Staphylococcus, Streptococcus, Cancer, Gonococcus, Diphtheria, Tuberculosis," etc. The demonstrator showed that if one of these bottles was put on the dynamizer and then the zone that corresponded was tapped, the tone would always come up unusually strong. Thus, the presence of a bottle containing the tubercle bacillus would make a very strong positive endpoint in the percussion tone as a sharp rise in pitch after from five to ten taps over the zone for tuberculosis. It was for this reason that the exhibition could not be made in the room containing the fixed pathologic specimens, which might contain influencing bacteria of the types con-

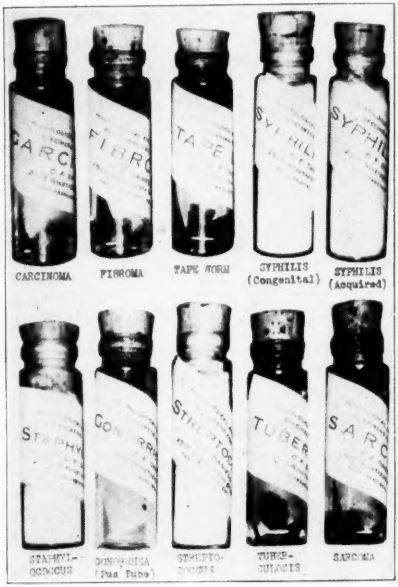

Fig. 2.—Test specimens and cultures for checking diagnosis.

cerned. (Our culture from the bottle marked "Streptococcus" grew only haybacillus).

EXPERIMENTS

Among the many specimens tested for us by him was one consisting of clippings from the lung of a rabbit that had just died from our inoculation with tuberculosis, belonging to a series, all of which have shown the same typical lung lesions, and demonstrated to contain the original and inoculated strain of tubercle bacillus. Blood specimens were included with it. The demonstrator knew that this material was taken from a rabbit that had just been subjected to postmortem examination, but did not know the source of the culture that was given to the rabbit or the type of lesion from which the rabbit died. He stated that from this he could tell the symptoms from which the patient was suffering. Notwithstanding the quantity and concentration of the involved virus, he was not able correctly to identify the infection.

Later, he tested the blood of this rabbit, as one of the blood specimens, thinking it was from a patient, and stated that, notwithstanding the fact that the patient had the following positive lesions: streptococci in the tonsils (the left one in particular) heart, right ear, bones; 30 ohms of acquired syphilis in the heart, nerves, brain, bones and joints; from 5/25 to 8/25 ohms of cancer which he did not locate, he did not have tuberculosis.

One of the specimens that I gave him was an artificial blood made by combining a water-color paint with argyrol. He found that this patient had the following diseases: streptococci in the ears, tonsils, heart, colon, and gallbladder; 30 ohms of congenital syphilis, affecting the nerves, brain, bones and joints, and digestive tract; and 7/25 ohms of cancer, located in the left breast and uterus.

Among the considerable assortment of blood specimens from which he made diagnoses were two taken from the first patient mentioned, who had previously suffered severely with deforming arthritis and has much muscle atrophy resulting from anterior poliomyelitis of childhood. The two specimens of blood, which were kept downstairs and were not, therefore, subjected to any undue influence from the machine or otherwise, were used, one following the other, in order to determine whether two specimens taken from the same patient, at the same time, under precisely the same conditions, preserved for twenty-four hours under the same conditions, and run one immediately following the other, with all conditions of the instrument, diagnostician and subject as nearly constant as could be, would give the same readings.

From the first test he found malaria, in the second, none.

Streptococcus and syphilis were found in both tests.

Carcinoma was not found in the first, but found in the second.

Tuberculosis was not found in either.

Streptococcus found in the tonsils both times.

Streptococcus was found in the fallopian tubes the first time, but not found in the second test.

Streptococcus was found in the genito-urinary tract the first time, but not found in the second test.

Streptococcus was not found in the heart the first time, but was found the second time.

Streptococcus in the teeth was not found at the first test, but was found at the second.

Streptococcus was found in the spine, fourth lumbar vertebra, in second test, but not in the first.

Syphilis of the heart was found the first time, but not found the second time.

Syphilis of the nervous system was found both times.

General paralysis was not found either time.

Syphilis of the bones and joints was not found the first time, but was found the second.

Syphilis of the ears, not found the first time, was found the second time.

Cancer of the breast was negative the first time, positive, the second.

Cancer of the lungs was negative the first time, positive the second.

Cancer of the gallbladder was negative the first time, positive the second.

From this, it will be seen that thirteen items of the diagnosis were different in

these two diagnoses made within a few minutes of each other.

An important finding in the many diagnoses, and a great surprise and shock to us all, was that so many of the unsuspected individuals and rabbits, guinea-pigs and paint had syphilis. We therefore had arranged to use the blood of a male patient from a skin clinic, who had very positive and abundant signs of syphilis, as shown by the following facts: Internist's report showed that the patient had syphilis in the third stage, with many scars on the chest, the result of syphilitic lesions of the second stage, and was a chronic alcoholic. The condition had been diagnosed in a local hospital clinic, and the treatment had been started but was discontinued by the patient. The diagnosis in this case showed this patient to have the following: 14/25 ohms streptococci; 2 10/25 ohms cancer, located in the uterus, breast and gallbladder. It will be noted that this is the only blood examined on the two different days that did not show syphilis, and yet this was the lesion that was fundamental in this individual.

I asked the demonstrator what percentage of people he found to have syphilis: whether the percentage would be as high as 75, and he stated that nearly all the people he examined had it, more than 90 per cent.

Treatment

As part of his equipment consisted of a treatment unit, which is shown in Figure 3, we asked him to demonstrate how it was used and what it would accomplish. He suggested that he take the blood from anyone in the room, and stated that he probably would find that the individual had syphilis; that he could treat the condition and cure it in about ten minutes, if it were not too far advanced, and that we would see immediately the difference in the reading, as expressed in the change in tone, by the improvement in the syphilitic condition of the patient. There were plenty of volunteers to furnish blood. The physiologist, whose health was excellent, was selected and was found apparently to have a very aggravated case of syphilis, 22 ohms, for which the demonstrator proceeded to give a treatment for ten minutes. I begged them to extend the

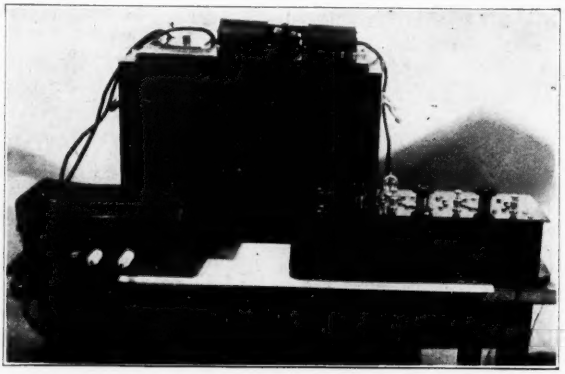

Fig. 3.—Treatment unit, Abrams. The large box is the oscilloclast.

treatment to make sure that it was a complete cure, so it was continued for twenty minutes, at which time the syphilis reading had reduced from 22 to 5 ohms, and he suggested that about two minutes more treatment would probably remove the balance.

In receiving treatment, the patient held in his hand an electrode, ending in a disk about 3 inches in diameter, which was supposed to give off a potent but undetectable discharge, which passed readily through his clothing to cure his ailments. The large instrument on the table, furnishing this current, was called the "oscilloclast." It has a rocking mechanism which breaks the circuit and probably introduces a little inductance, and is used through a box of series resistance. Eight patients can be attached to one oscilloclast, which makes an interesting noise like a metronome or a loudly ticking clock. This instrument was said to have the power of neutralizing the dynamizer and preventing its impulse to reach the subject. When this disk was brought near to the dynamizer, percussion on the subject's abdomen gave a continuous tone without change of pitch. If it was taken a few inches away from the dynamizer, the tone became stronger and stronger. It became quite strong at a distance of 6 feet, but still had influence at 16 to 20 feet, and the operator demonstrated a difference in the tone, at even this distance, whether this disk was pointed toward the ceiling or toward the dynamizer.

Controls

During the progress of the many tests, I took occasion to remove plugs from contact points, where I could without being observed, for all of this work had to be done in very subdued light, and I could not tell any difference in the tone whether the circuit was complete or not. When I called his attention to this fact, the demonstrator informed me that my own handling of the apparatus would disturb its efficiency and that I should not do it. I therefore arranged to get the same result without touching it. While we were all dismissed for luncheon, I removed the connector between the intensifier and the rheostat, between the small instrument in the center and the one next to it, and, after taking off the plug, took the metallic core out of the center of the end of the wire for a distance of about three-fourths inch and filled it with a nonconducting hard wax, which gave the wire about its original stiffness. (Compare insert in Figure 1). The silk-covered wax cord connector was fastened into the metallic plug with some of the insulating wax and the connector was replaced. The instrument was again used in this way with all the precision and efficiency that had been used on the two previous sessions. In fact, the operator commented on the splendid working quality of all of the conditions.

I explained to the doctor and his assistant that, in all our research work, all our progress is based upon what we call "controls." Conditions are set up in several different forms with only one variable factor at a time, and the presence or absence of this variable factor on repeated tests will be considered to be related to the change in result in proportion to the certainty that no other conditions have been changed and no new factors introduced besides the one being checked; that, accordingly, if I were to make a research problem of his instrument, as he had come a long distance especially to have me do, it would be necessary for me to proceed in this fashion, and suggested as a simple test that he tell us whether or not the blood of a given patient (and he might select his own specimen) was in the dynamizer or not, by the results he would get in

percussing his subject. He readily acquiesced in this test, and in the first five times was in error four times. The specimen, not having been in the instrument at any time after its first removal, was given to one of the assistants who took it to a distance away from the instrument. He stated that this was not a fair test as he was mentally disturbed and distracted and not able to concentrate properly. I explained to him that there were certain tests that, because of this type of mental involvement, should be made without the knowledge of the operator, giving illustrations, and it was for this reason that I opened the circuit by removing the metallic core from the connector, as previously stated.

I asked him to give me a demonstration in which I would take part myself. To this he cheerfully assented, outlining the following procedure, which was carried out. He used as the patient his own case because he knew so well his own conditions. Instead of taking his own blood, he wrote at length on a piece of paper and placed this in the dynamizer. After setting the rheostat properly, he placed the double electrode on the subject's head and the contact point from the diagnostic instrument was held by the subject against the bare chest. I was given the electrode that was connected to the subject's headpiece. It was explained that the impulses would come from his brain through the 6 foot flexible, single strand cable to the handpiece electrode that I held in my hand, and I was to pass this up and down the back, limbs and fingers of the subject a few inches from the subject, but always holding the electrode at right angles to his body. When I came opposite the back of his leg, about half way between his knee and ankle, the pitch of the tone suddenly rose and indicated a very marked reading. The operator then exhibited his leg, which showed edema above the ankle and which he stated had previously shown cellulitis, which I had hereby diagnósed. In doing this, I disconnected the cable part of the time and the pitch went up the same when my other hand was opposite his shin, whether the circuit was connected or not.

I have previously referred to the method of determining the intensity or quantity of an infection or neoplasm of a given type by measuring the ohms and fractions of an ohm. It was demonstrated that he could read the ohmage to a twenty-fifth of an ohm on many occasions and go back to that same reading within one or two twenty-fifths every time, which was explained to me as one of the best proofs of the exactness and certainty of the process. While making the demonstration, I, without his knowledge, changed the position of his total ohmage lever and had him repeat the test, and the fraction came out exactly the same as previously. This is like using the ounce weights after having determined the total number of pounds in order to find the last fraction of a pound, and then making the scales balance after taking off one of the pound weights and balancing it with the same number of ounce weights that were used previously.

These results very definitely indicated to me that the matter was one consciously or unconsciously within the control of the demonstrator and his subject. I desired to test the effect of suggestion on the demonstrator, and I found that if I suggested that a sound was coming up clear and strong, on repetition it did come up clear and strong and made a positive reading; and if I would suggest that there was apparently nothing there, on a repetition there tended to be nothing there, and it was very easy for me to get the impression that I was influencing the demonstrator. I do not have any power to hypnotize and am sure that

neither the demonstrator nor his subject were influenced in any of their other interpretations by any suggestion that came from myself or anyone else, for I did not make any suggestions during the major portions of the readings.

Summary and Conclusion

I told the demonstrator that I would send him this detailed written report, but before doing so I wanted to go over with him in detail, while all these witnesses were present, many things that had occurred. I showed him, for example, the specimen of blood which consisted of a water-color paint and argyrol, and reminded him of his reading, which indicated that this patient had streptococci in the ears, tonsils, heart, colon, and gallbladder; 30 ohms of congenital syphilis, affecting the nerves, brain, bones and joints, and digestive tract; and 7/25 ohms of cancer, located in the left breast and uterus; also, how the specimen of rabbit's tissue, and, later, blood from this rabbit, which he was analyzing, was from a rabbit recently examined postmortem, which had died of tuberculosis of the lung, the culture of which we had inoculated, and how his statement was very positive that there was no evidence of tuberculosis indicated from this specimen; how he had given three different readings on the same patient, all very different; how his reading of the blood of the patient with syphilis indicated that that patient did not have the disease and that practically all the readings of other samples in the three sessions had shown syphilis; how, out of six trials that he had made to tell whether the specimen was in or out of the dynamizer, he had been in error five times, when, according to the law of chance, he should have been right half the time; and, finally, how he had worked for hours with his machine with his circuit interrupted by the removal of the core from the wire and placing wax therein, with conditions which he stated to be particularly satisfactory so far as the working of his instruments was concerned. I also showed him the insulating wax in the wire, which is so splendidly dielectric that it is used for insulation for high potentials. When he suggested that possibly this wax was a good carrier, I made a test of this by a very sensitive galvanometer with a high voltage; which would have completely ruined the instrument had there been good capacity for conduction. Indeed, this instrument would show a millionth of an ampere of current, and there was not the slightest deflexion; in other words, it had a resistance approximately equal to that of a telegraph wire reaching from the earth to the moon and back.

He assured me that he recognized that he had been mistaken, but that he had acted in good faith and never thought to make such tests for himself. It was mutually agreed that I would not publish his name but that he would write to the proper officers of his local society and explain that he had been mistaken, and that he would discontinue its use and use his efforts to have the practice discontinued by others in his community. He stated that I was privileged to publish this report, without his name.

The seriousness of this matter in the interest of humanity cannot be estimated. I have been told of a case of an unmarried woman who committed suicide after being told by this method of diagnosis that she had syphilis, and of a practitioner, who is probably only one of a great many, who is treating up to and exceeding 100 patients a day on the basis of $6 an hour, or $3 for half hour treatments. The demonstrator told of an operator who had made more than 7,000 blood diagnoses, a large part of the patients receiving treatments by him or by others, and that the average cost per patient for treatments would be

about $100. We were advised by the subject that a customary charge for the time spent reading a patient's blood was from $10 to $15 and that it took from ten to fifteen minutes, or a dollar a minute. He stated frankly that he was personally not interested in whether the instrument was efficient or not; that he was concerned and interested in the money that he got for acting as a subject, and that he had been serving as a subject for about five years. He cited cases where he thought cures had been made.

The operator and demonstrator made very elaborate comments and detailed explanations as the operations proceeded. These were taken by a stenographer and have been typed and are available, if desired, for elucidating this report.

We have made some tests to throw light on the nature and origin of the endpoint, which is a change in the tone of the percussion note. We are also testing the capacity of blood and such specimens as were used to discharge a very sensitive condenser. The evidence so far developed indicates that the presence or absence of a change in tone depends on the following factors: Under certain conditions of continued pressure and the stimulation of tapping, muscles go into slight rigidity, which raises the pitch of the percussion note. We noted that it took from ten to fourteen percussions to bring this change when the subject was first used and the muscles were therefore in their maximum tone. As he became more tired, the average time at which the endpoint appeared, extended to twenty percussions, and ultimately on some occasions to twenty-four. We have found, as was demonstrated by the operator, that it was necessary that he be very careful to tap the same place on his finger; that is, if he extended toward the nail the pitch went higher and would produce a false endpoint or positive reading. Similarly, we find that a considerable difference depends on the tension of the flexor muscles of the finger being tapped, since it is necessary to maintain pressure with that finger. Another variable, which relates to time, is the pressing of the blood and lymph out of the subcutaneous tissues over the abdominal muscles; and still another, which relates particularly to the percussions in those zones that are over folds of the small intestines, which seem to depend on the passing of a bolus of food or volume of air, and the same point on the abdomen will give quite different percussion tones over the intestines within a few minutes' time. It seems a tragedy that so many variables should be entering into the endpoint on which the life and finances of so many individuals are being placed.

Owing to the length of the report, we have presented here only a part of the important data obtained.

The Journal of the American Dental Association

5 North Wabash Avenue, Chicago, Illinois.

Please send in promptly notice of change of address, giving both old and new. Important information regarding subscription price, etc., will be found in the advertising pages.

Editorial

DENTAL EDUCATION

In an excellent editorial in the April, 1924, number of our esteemed comtemporary *The Pacific Dental Gazette*, the subject of a new dental act for Italy is made the medium for discussing, in a most able manner, the long mooted question as to whether it is better for the public that the practice of dentistry be dominated by medicine, or whether it shall proceed under its own direction as it has in this country for more than eighty years.

No amount of theorizing will serve to offset the facts of actual experience, and in America, at least, experience has shown that dentistry received its greatest impulse toward advancement when it got out from under the wing of medicine and established its own teaching institutions. No one questions today the great benefit to be gained by close cooperation between medicine and dentistry in many of the conditions that arise in practice, and yet it is undeniable that there are various phases of medical practice in which the dentist is only remotely concerned, if indeed he is concerned at all. And there is very much in the practice of dentistry about which the medical man is almost wholly ignorant; nor can he, with all his medical foundation, acquire an intimate or working knowledge of the many technical processes carried out by the dentist every day in his practice, without undergoing extended training, the same as any student of dentistry. In other words, to train a man ever so well in the science of medicine does not by any means equip him to practice dentistry; nor does too extended a course in purely medical subjects—in the practical experience of those who have had the best facilities for observation in the training of students—ever develop an enthusiastic tendency to master the many necessary technical processes inseparable from a well-rounded dental course. As Dr. Endelman puts it in the editorial just referred to: "It has been the observation of many dental teachers that graduate physicians who undertake the study of dentistry seldom attain the manipulative skill of

the average dental student who has been under educational supervision by the dental school from the inception of his dental studies. The medical control of dental education has not been a success in the past, and once more this contention has been sustained by a dental law recently enacted in Italy."

Of course, we are not in a position in this country to realize the conditions existing in European countries; nor do we know what would be specifically best for any other environment than our own. We can only judge of these matters by the experience we have had in the development of dentistry in America, and in this respect we are at least certain that dental practice never would have advanced as it has if it had been retained under the wing of medicine, or had been dominated wholly by medical policies.

The change in the regulations in Italy will be watched with keen interest by everyone, and we can only express the hope that whatever the immediate outcome of the present innovation may be, the ultimate result will redound to the benefit of dentistry, and that the people of Italy will receive a better dental service. One thing, at least, is certain: if the new idea does not prove beneficial to the people of Italy, it is inevitable that a change will be made back to the old order of things, so that in any event the experiment is well worth making.

TRANSPORTATION TO DALLAS

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Grand Rapids, via Chicago or St. Louis	61.49
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Those traveling via Chicago or starting from that point, will make Pullman reservations through W. G. Ferstel, District Passenger Agent, Illinois Central Railroad, 208 S. La Salle St., Chicago, Ill.; or J. J. McQueen, General Agent, Passenger Department, Missouri Pacific Railroad, 714 Standard Trust Bldg., Chicago, Ill.

Those traveling via St. Louis or starting from that city, make reservations through J. M. Griffin, Division Passenger Agent, Missouri Pacific Railroad, 1650 Railway Exchange Bldg., St. Louis, Mo.

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Those traveling via Kansas City or starting from that city, make reservations through W. H. Donny, Assistant General Passenger Agent, Missouri Pacific Railroad, Railway Exchange Bldg., Kansas City, Mo.

For further particulars concerning the special train please confer with any Illinois Central or Missouri Pacific representative listed above.

The May issue of the JOURNAL OF THE AMERICAN DENTAL ASSOCIATION gave a general idea of the trip to Dallas. The July issue contained additional data on the "convention city" (Dallas) and went into more detail of the trip, especially the stops at Little Rock and Hot Springs. Additional information will follow.

D. C. BACON, *Chairman Transportation Committee,*
Columbus Memorial Bldg., Chicago, Ill.

TO OUR ADVERTISERS

The September issue of THE JOURNAL—*the Dallas Number*—will be mailed to 47,000 dentists. There will be ninety-six extra pages. Nearly two carloads of paper will be used, at a cost of about $11,000.00.

The cover design will symbolize, in a striking manner, the Dallas Session. This issue will contain the complete program of the Great Meeting, including titles of all the papers with the names of the essayists and the discussers, the titles of all the clinics and the names of clinicians, together with a list of all exhibitors. The *Dallas Number* will be designated the "Blue Book" of the Meeting.

We are offering a special flat rate of $85.00 per page for *new or increased*

advertising business for this issue. Copy for the September JOURNAL should be received at this office on or before August 10, 1924.

What an unusual opportunity the *Dallas Number* offers to our advertisers! This issue will reach practically every dentist, dental hygienist, dental assistant and dental laboratory man in the United States and Canada.

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IN MEMORIAM

HENRY LOVEJOY AMBLER, M.D., D.D.S.

BY W. H. WHITSLAR, M.D., D.D.S., Cleveland, Ohio

Henry Lovejoy Ambler, scholar, historian and dentist, passed away the morning of June 14, 1924, aged 81. He was born September 10, 1843, at Medina, Ohio. The cause of his death was interstitial nephritis superinduced by other disturbances beginning early in the spring, when he suffered an attack of bronchopneumonia.

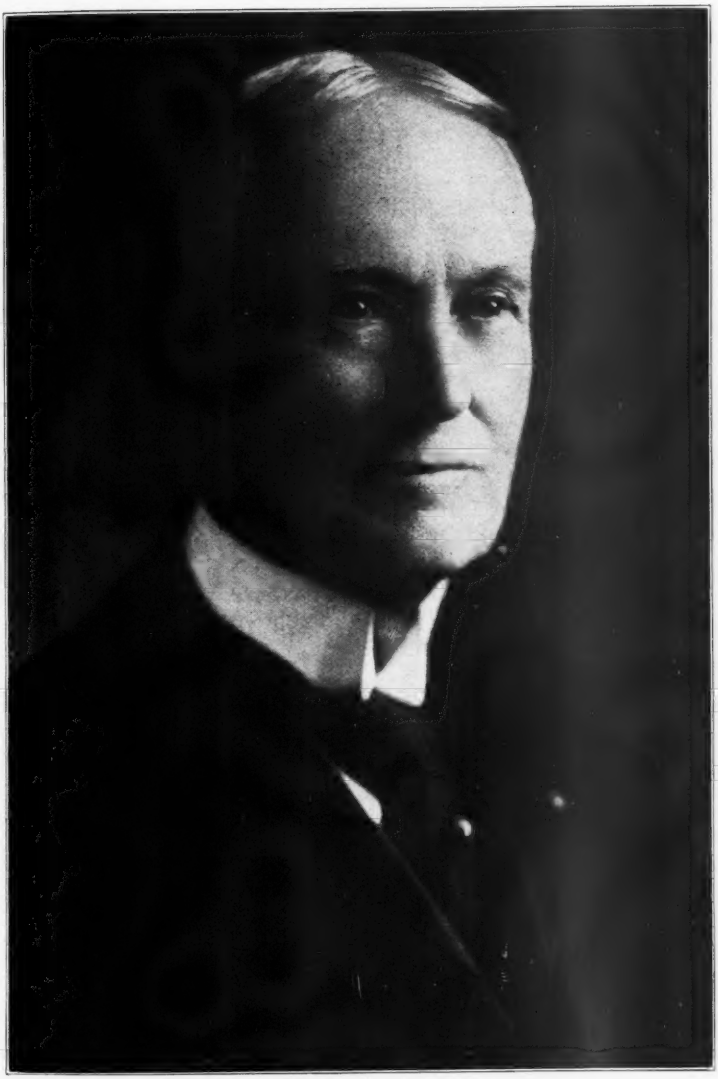
Dr. Ambler developed the habit of study when a boy, being the youngest member of his class to graduate from Hillsdale College, Michigan, from which he received the degree of M.S. He served as deputy treasurer of the college for four years.

Throughout his entire career, his mind was active in scholarly pursuits and his knowledge embraced a wide field of information. This was enriched in 1909 when he went on a trip around the world on the Cleveland, the first steamship to make such a trip with only passengers and the necessary equipment. On this trip he observed the modes of dentistry in countries he visited and wrote a book about it. He collected brass castings of idols in India and many curiosities, which were interesting to dentists and friends. He gave many illustrated lectures about the trip.

He was a keen observer and at one time published a book on "Facts, Fads and Fancies." He became a student of natural history. His knowledge of dental history was a real recreation for him, and he was regarded as one of the best historians of dentistry in the United States. His knowledge of and acquaintance with many of the early pioneers of dentistry made him cognizant of the early efforts of dentists in the development of the profession. As professor of operative dentistry and dean of the dental college of Western Reserve University for fourteen years, he incorporated complete historical data in his lectures, which he delivered with preciseness and authority. He succeeded Dr. Charles R. Butler, the first dean, in his college work, resigning in June, 1907.

Dr. Ambler came to Cleveland in 1864 and studied dentistry with his uncle, N. H. Ambler, an influential citizen, who left a large estate and also valuable land to Cleveland. Dr. Ambler graduated from the Ohio College of Dental Surgery in 1867 and received his medical degree from the Cleveland Homeopathic College in 1868.

He was a member of the American, Ohio State, Northern Ohio, Cleveland City, Forest City, and West Virginia dental associations; and was on the Committee on History of the American, Ohio State and Cleveland City associations. He bore the unique mantle of critic of the Cleveland Dental Society twenty-one years, in which capacity he taught the correct pronunciation of words and historical facts in an entertaining and profitable manner. He was also a member of the World's



HENRY LOVEJOY AMBLER, M.D., D.D.S.
1843–1924

Columbian Dental Congress, (Chicago) 1893, Preparedness League of American Dentists, International Dental Congress (St. Louis) 1904, National Institute of Dental Pedagogics, Local Advisory Committee of the National Institute of Dental Research, Cleveland Chamber of Commerce and the Euclid Avenue Congregational Church, and ex-president of the Ohio State, Northern Ohio, Forest City and Cleveland City dental societies.

He was among the first (1868) to lecture to medical students on the Institutes of Dental Science in Connection with Medicine.

He wrote many articles on different subjects for dental, medical and popular magazines. He was also the author of "Tin Foil and Its Combinations for Filling Teeth," "History of the Northern Ohio Dental Association," "Chapter on Dental Prosthesis in History of Dental Surgery," and "History of Dentistry in Cleveland."

He was probably the first (1896) to introduce cataphoresis west of New York for obtunding sensitive dentin and treating roots with silver nitrate. He invented a left-hand assistant for starting fillings; a cylinder roller for foil, drills for engine, a set of knives for operations, wooden awning window blind, metal table markers, etc. In 1872, he introduced filo silk to the dental profession, to be used in place of floss silk.

Dr. Ambler's father, who was born in Vermont, and his mother, who was born in Yorkshire, England, lived to be 90 and 88 years, respectively. His father was of English parents. Dr. Ambler was first married at 33 to Annie Jenness Merwin, who died a few years ago. He leaves a widow, Mrs. Juliet A. Ambler, to mourn his loss.

Dr. Ambler was widely known as a scholar and lecturer and left an indelible imprint of his authority on the dental profession. His last words to the writer were an inquiry about the Northern Ohio Dental Association then in session, and with great difficulty he added "Love."

He lies buried in Lake View Cemetery at Cleveland.

THE DALLAS MEETING

Sixty-Sixth Annual Session

American Dental Association

To be Held in

DALLAS, TEXAS

November 10, 11, 12, 13, 14, 1924

Medical and Dental News

DISTRICT OF COLUMBIA DENTAL COMMITTEE

June 15, 1924.

Dr. Otto U. King, Secy.,
American Dental Ass'n.,
Chicago, Ill.

Dear Doctor:

Our goal is achieved! President Coolidge signed the new dental law for the District of Columbia June 7. A copy is enclosed herewith for your information. We believe that we have a law as progressive as any in the various states; at any rate, the foundation is laid and any changes found necessary by experience can be obtained quite easily through amendments. Words are inadequate to express our appreciation of the wonderful assistance given us by our friends in the profession throughout the states. Without it, it would have been impossible of accomplishment, especially in this Congress, when the legislative jam was greater than ordinarily. Undoubtedly, many members of Congress gave us their support of which we did not hear, but we cannot allow this letter to go out without advising our friends of the names of the men in Congress who were active in our behalf: in the Senate, Honorable Royal S. Copeland, New York; L. Heisler Ball, Delaware; Alva B. Adams, Colorado; and Morris Shepard, Texas; in the House of Representatives, Honorable Frederich N. Zihlman, Maryland; Oscar E. Keller, Minnesota; R. G. Fitzgerald, Ohio; Gale H. Stalker, New York; Christie Sullivan, New York; Allard H. Gasque, South Carolina; Col. John Q. Tilson, Connecticut; Nicholas Longworth, Ohio; H. R. Rathbone, Illinois; Speaker Gillette, Massachusetts; Finis Garrett, Tennessee, and Judge T. G. Harrison, Virginia.

The Committee desires to thank you heartily for the help given us in getting this law through Congress. Many of the men went far out of their way in lending their assistance and to them we are exceedingly grateful.

With kindest regards,

Fraternally yours,
Chas. D. Cole,
Chairman of Committee
W. M. Simkins,
President, Board of Dental Examiners
C. A. Hawley,
Secretary, Board Dental Examiners
C. Willard Camalier,
Secretary to Committee.

Committee: Charles D. Cole, W. M. Simkins, C. A. Hawley, H. P. Cobey, C. W. Camalier, Clyde M. Gearhard, C. W. Cuthberston, C. H. Howland.

GEORGIA

Dr. Hinman Honored: The University of Georgia, at Athens, June 18, conferred the honorary degree of doctor of science on Dr. T. P. Hinman of Atlanta, the first member of the dental profession to be thus recognized by this university. Dr. Hinman is dean of the Atlanta-Southern Dental College and professor of oral surgery in that institution.

ILLINOIS

Medical Editor Resigns: Dr. George H. Simmons, for twenty-five years general manager and editor-in-chief of the Journal of the American Medical Association, has resigned. Dr. Morris Fishbein, formerly assistant editor, has been appointed acting editor-in-chief and Dr. Olin West, secretary of the association, has been appointed general manager until the next meeting of the board of trustees of the association, early in 1925.

IOWA

Dental Examinations for Pupils of the Rural School: Green County, Iowa is perhaps the first county in the middle west to institute a thorough dental examination

of all the children in the rural schools. The work was managed through the office of the Green County Red Cross nurse, Miss Betty Nicol, with the following dentists making examinations and records: Drs. J. E. Anderson, Charles Humphrey, M. L. Holmes, D. E. Lyon, B. C. Puckett, S. G. Barker, P. D. Herrick, W. A. Ruge and L. O. Hopkins. In order to complete the examination it was necessary for each dentist and his assistant to spend about two days driving in the country in his car. Ninety schools were visited and 2,525 pupils were examined. Individual record cards for each pupil were mailed to the parents with advice in regard to any work which needed to be done. One surprising thing was brought out in this work. The same men had previously examined the teeth of the children in the town schools and, while they found only 26.87 per cent of the town children free from caries, there were 33.33 per cent of the country children free from caries, the better diet of the farm child probably accounting for this difference. The project met with general favor on the part of the parents and proved to be a worthy piece of dental education and publicity. The benefits derived from the examination have been very apparent.

MAINE

Maine Public Health Department Appoints Hygienists: The Maine State Department of Public Health has appointed Miss Dorothy Bryant and Miss Madeline Shipton state dental hygienists.

MASSACHUSETTS

Dentists at New England Health Institute: At the New England Health Institute held recently in Boston, sixteen professions were represented, dentists and dental hygienists ranking seventh in number enrolled.

OKLAHOMA

Resolutions by Oklahoma City Dental Study Club: This club, composed of forty-one members, recently passed resolutions, deploring and condemning the exhibition of pictures and plays burlesquing and tending to ridicule the dental profession, which they regard as misleading, tending to have an unwholesome effect and producing unpleasant and exaggerated impressions on the minds of the public, especially children of scholastic age. It is believed that much needed preventive measures and corrective treatment will be put off until much injury has been wrought, through bad impressions of dental operations thus obtained.

Thirty Dentists Lecture to 20,000 School Children: In Oklahoma City, thirty dentists delivered before twenty thousand school children a lecture on health. The points emphasized were: a clean mouth; mastication; preventive care and proper diet.

RHODE ISLAND

Dental Measure Passed: The House of Representatives unanimously passed the Andrews dental bill, May 27, after an amendment offered by Representative Kiernan of Providence to permit corporations to continue practice of the profession had been overwhelmingly defeated. The measure provides that no person by any method whatever shall practice dentistry except under his own name. It prevents a person from practicing under an assumed name or corporate name or by fraudulent or misleading advertisement or statement. The penalty for violation of this section is a fine of not less than $50 or more than $300; imprisonment not exceeding 90 days, or both fine and imprisonment. One of the important changes made by the act in the present law strengthens the educational requirements. It provides that any person applying to the state board of dentistry for a license to practice dentistry in this state shall be graduated from an accredited medical or dental college. The penalties for persons practicing dentistry without a license are increased. Every practicing dentist is required to post in a conspicuous place in his place of business, his registration card. The measure as passed has the approval of the Rhode Island State Dental Society, the state board of registration in dentistry and the Providence Chamber of Commerce, as a means of affording better protection of the public from incompetency and carelessness.

FOREIGN

Causes of Dental Disease: Reports to the Dental Board of the United Kingdom (Dental Surgeon, June 21, 1924) from workers investigating the causes of dental disease cover the following items under the head of dental caries: Incidence of Streptococcus mutans in carious teeth; production of artificial caries; characteristics of S. mutans; isolation of

S. mutans and B. acidophilus from saliva; microscopic sections, and sequence of events in early caries of the dentin.

The method of Science: Professor Huxley described the method of science thus:

(1) Observation of facts, including that artificial observation which is called experiment.

(2) Comparison and Classification: the process of tying up similar facts into bundles; the ticketed bundles being named general propositions.

(3) Deduction, which takes us from general propositions to facts again.

(4) Verification.

The lives of such men as Pasteur and Darwin illustrate the method of science at work. Of such men must Carlyle have been thinking when he described genius as the infinite capacity for taking pains. The disciples of Pasteur, the founder of modern preventive medicine, are today a multitude and their labours are continually shedding light in places where formerly darkness held sway. Immeasurable benefits have been conferred upon mankind by such men, the fruit of whose work we ourselves are enjoying at the present moment.

The majority of us are not slow to form hasty opinions and to offer criticism. Before an opinion is really worth possessing or a criticism is worth uttering, it is essential that some such procedure, as was described by Professor Huxley as "the method of science," is adopted.—British Journal of Dental Science.

Cinematograph Demonstrations: The idea of using the cinema for educational purposes is not a new one, and has been regularly employed for some time in various countries. In France we have already many educational films especially medical and surgical ones; those of Doyeu, Comandon, Calmette and Pauchet, for example, are well known. But until lately there were very few dental films to be obtained. M. Morineau, it was, who had the happy idea of teaching dental technic by this modern method, and he recently presented before the Odontological Society of Paris a film of moving diagrams entitled "Filling with Soft Gold," of the greatest interest. M. Morineau and a great part of the teaching staff of our colleges rightly think that this mode of instruction, interesting, simple and attractive as it is, giving little trouble to the lecturer and exacting little effort from the student, will be of the very greatest service.—La Semaine Dentaire.

GENERAL

Anesthetists Honored: During 1923, the Associated Anesthetists of the United States and Canada continued their splendid precedent of honoring outstanding workers in the specialty with tributes of appreciation. At the San Francisco meeting of the American and Pacific Coast Anesthetists with the Section on Anesthesia of the California State Medical Society, Dr. Eleanor Seymour of Los Angeles was presented with a silver loving cup bearing the following inscription: "To Eleanor Seymour, M.D., President American Association of Anesthetists, 1922-1923, In Appreciation of Splendid Services in the Organization and Development of the Specialty of Anesthesia from the Associated Anesthetists of the United States and Canada." During the past twenty years, anesthesia has been served in a remarkable way by Dr. E. I. McKesson of Toledo, Ohio, and during the Second Annual Congress of Anesthetists in Chicago, last fall the Associated Anesthetists also presented him with a loving cup, bearing the following inscription: "To E. I. McKesson, M.D., in Recognition and Appreciation of Remarkable Researches and Technical Advances in the Practice of Nitrous Oxid-Oxygen Anesthesia and Analgesia from the Associated Anesthetists of the United States and Canada."—American Journal of Surgery, July, 1924.

A. M. A. Members!: In the opening meeting of the House of Delegates of the American Medical Association, Dr. Olin West, Secretary of the Association, stated that there are now more than 90,000 physicians holding membership in the Association, out of a total of 145,000 physicians in the United States.

Radio Demonstration: At the annual session of the American Medical Association, an unusual feature was a demonstration, by the Western Electric Company of a method enabling 750 physicians at one time to listen to the heart beat and lung sounds of a patient. Radio tubes and amplifiers were used and physicians in the audience, using their own stethoscopes applied to the radio ear phones, heard the sounds exactly as they were being heard by the demonstrator.

Death of the President's Son: The following telegraphic statement was received by the Journal of the American Medical Association in regard to the illness and death of Calvin Coolidge, Jr.: "He suffered from a septicemia, subsequent to a friction blister, without any local lymphangitis or enlargement in the

popliteal glands, and only moderate tenderness and enlargement of the inguinal glands. The original lesion healed promptly under continuous bichlorid soaks. The staphylococcus albus with moderate hemolysing qualities was recovered from the wound, the urine and four blood cultures. A blood culture made the day before death with 2.0 c.c. of blood showed 500 colonies to a small sized Petri dish. A localization of the process appeared in the tibia in the other leg, which under a ten minutes' gas oxygen anesthesia and trephining revealed a positive smear without frank pus. The usual routine for sepsis was used, including numerous intravenous salines and continuous proctoclysis. Citrated transfusion of blood from a donor immunized with injections of a vaccine made from blood culture of the patient, stimulation with alcohol and other reagents were used. Sixteen cubic centimeters of mercurochrome and 100 c. c. of staphylococcus antiserum were given intravenously. None of the usual reactions followed the mercurochrome. The white count varied from the patient's normal figures of 6,600 to 10,000, and on one occasion, 13,700, about three hours after the antiserum. The polymorphonuclears stayed at 74 per cent, rising on one occasion to 84 per cent. Ileus developed on the morning of the last day of illness.

Harvard University News: Dr. Leroy M. S. Miner, professor of clinical oral surgery, has been appointed dean of the dental school to succeed Prof. Eugene H. Smith, D.M.D., who has been dean since 1895. He will become professor of clinical dentistry emeritus. Dr. David Linn Edsall is to be dean of the faculties of both medicine and dentistry, as well as continuing as dean of the medical school. Prof. Charles H. Haskins, Ph.D., will resign as dean of the Harvard Graduate School of Arts and Sciences.—Journal of the American Medical Association, May 10, 1924.

Recent Developments in the Production of Fused Quartz: The General Electric Company recently announced the results of the ten years' experimentation of E. R. Berry, assistant director of the Thomson Research Laboratory at West Lynn, Mass., in producing clear fused quartz in quantity. His success it is believed, will be an aid in the development of and research in the use of the ultraviolet ray, since clear fused quartz, the most transparent substance yet known, transmits the ultraviolet ray, which is excluded by window glass. The work of producing fused quartz in quantity, in practicable form and at reasonable cost being practically finished, attention is being given to its possible uses in the prevention and healing of disease. Test on growth of plants and on poultry and mice with reference to disease and fertility are planned. Dr. W. T. Bovie, professor of biophysics at Harvard, in discussing the possibility that this discovery may mean much in the treatment of rickets, says: "This is a common disease—how common it is not generally realized. . . . It is prevalent among babies of the well-to-do who are not allowed to play in the streets. Playing in the sun behind window glass does not expose them to the beneficial rays. Quartz windows, which do admit these rays, are not entirely within the bounds of possibility, as a result of the work of Mr. Berry."

New Dental Journal: The Society of Dental Surgeons is about to issue a quarterly journal under the title of the Transactions of the British Society of Dental Surgeons, the first number of which is to be ready this month.—Dental Surgeon.

Antirachitic Factor in Egyptian Sunlight: From time immemorial man has instinctively partaken of the necessities for his own welfare. In prehistoric times, he lived by the chase. Later, he tamed animals to his service, derived nutriment from their flesh and their milk; he planted grain for his bread and planted a vineyard for his further delectation. In these wild days, he raised the pyramids of Egypt, rather the work of giants than of mere men. What recked he, toiling under the burning skies of Egypt, of the antirachitic factor in the sunlight. And yet the fine teeth of Egyptian mummies bear witness to the effective, but then unknown, potency of this element in nature.—Graham Lusk, in the American Journal of Public Health.

Care of the Teeth: The Standing Committee of the British Dental Association, which deals with matters relating to public dental service, is to request the Represestative Board of that body to remit to it for consideration the important question of hygiene. An active campaign has already been inaugurated by the issue of a pamphlet, entitled: "The Preser-

vation of the Teeth." Then, again, lectures suitable for different audiences have been devised. In this work, the Association is assisted by the Dental Board, the latter having appointed a committee to promote a propaganda on the subject, while the Ministry of Health is doing its part in the work of reform. As for the Board of Education, the last annual report of the chief medical officer states that year after year there is a fuller appreciation of the far-reaching effect of oral sepsis. It is pointed out that a great deal depends on diet, and the consumption of fresh salads and raw fruit in plenty is advocated as the chief preventive against dental disease.—Dental Surgeon.

Teeth of War Babies: There is now a certain amount of evidence enabling one to judge the correctness of the anticipation that children born during the war years would in due time show, as one of the late results of the shortage of some essential foods, a relatively greater degree of dental deterioration than that recorded for children born in the earlier period. Mr. W. H. Jones, county dental officer to the Staffordshire Education Committee, in the course of his report for 1923, sets out some figures and comparisons that are interesting from that point of view. Taking the children born in the year 1918 as being about 5 years of age, and comparing the figures with those in previous reports, he finds a serious deterioration in the teeth of Staffordshire children. The 5 year old group of children born in 1916 had, when examined in 1921, on an average, 15.59 sound temporary teeth and 3.76 decayed. The 5 year old group born in 1917 had on an average 15.48 sound temporary teeth and 4.32 decayed when examined in 1922, and the group born in 1918 had 13.78 sound teeth and 5.74 decayed when examined in 1923. The indications given in 1922 of dental deterioration due to unemployment and other causes, became more evident in 1923. Mr. Jones believes that in regard to the relation between year of birth and concomitant deficiency of food, "the gloomy prognostications have come to pass."—Dental Record, July, 1924.

Postgraduate Work by Our Medical Societies.—The enterprising and studious medical man has kept abreast of the times by extensive reading and by contact with teachers and men of large clinical and laboratory experience, but this does not hold true with the rank and file of the profession, for a very large proportion of the medical men of this country who graduated a few years ago are way behind the times. In most instances this is due entirely to lack of initiative. Most medical men are not enterprising or studious, but apathetically fall back upon an attitude of complacency and self-satisfaction which utterly fails to meet present-day requirements when the people desire and are entitled to the best results. The doctor who graduated from fifteen to twenty-five years ago is a back number in every sense of the word unless he has taken time to read the best medical journals and latest medical books and has taken advantage of and profited by the opportunities offered to do postgraduate work. Many doctors do not even wish to attend their local medical society meetings but flatter themselves that they are as good as their confreres and consequently nothing can be learned through contact with their immediate associates. This is false reasoning and really speaks volumes in defense of a proposition that the man who is self-satisfied is always ignorant.—Journal of The Indiana State Medical Association.

How to Get Our Vitamins: The keynote to successful nutrition lies in the proper selection of foods. The place to get our vitamins is in the grocery store and the fruit and vegetable market, and not in the drug store. When the family budget is invested in wholesome foods, properly selected so as to form a well-balanced diet, all the vitamins necessary for health will be obtained, and, in addition, the body will be supplied with a great array of other equally important substances which nobody's commercial vitamin tablets can furnish.—Hygeia.

Dental Advertisement—100 Years Old

The Editor,
The Journal of the American Dental Association,
Chicago, Illinois,
U. S. A.

Dear Sir:

The other day I came across the enclosed advertisement, which was reproduced in our local paper here. It originally appeared in the columns of the same paper exactly a century ago.

It certainly makes amusing reading and it might be of interest to you. I

should have sent you a copy of the paper but I have only one, which I wish to retain. The enclosed, however, is an exact copy of the advertisement.

Yours truly,
F. B. Bostwick,
94 Main Street,
Gibraltar

An Italian Dentist and Corn Cutter, is lately arrived and lodges at the Mason's Hotel, Parliament Lane, who cleans and plugs teeth, separates them, when necessary, to prevent corrosion, strengthens such as are loose, and shortens those that are too long. He puts in Artificial teeth, so as to make them both firm and becoming and to prevent their falling out, or impeding eating, speaking, singing or any other functions of the mouth, all of which are performed without inconvenience or pain. He has lotions that whiten and strengthen loose teeth, prevent caries and corrosion, and sweeten the breath. He also cuts corns and removes carnosity from the nails; repairs Elastic Trusses, for both sexes, and for children, in perfection, and on moderate terms, and makes all sorts of Suspenders.

He will wait on such persons as may be pleased to send for him, and attend on others at his lodgings.—Copy of advertisement which appeared in "The Gibraltar Chronicle" in December, 1823.

Look Out for These Fellows!: The crooked stock salesman talks in terms of "units." He offers you a block consisting of one share of preferred stock and several shares of common.

The faker nearly always "knocks" Wall Street and the banks. He asks you to help keep his company out of the hands of the robber bands of Wall Street.

No faker will ever use the word "speculation"; he always calls it "investment." He guarantees you absolute safety, though no stock purchase is without some element of risk.

The crook always talks about the enormous dividends that have been paid on the stocks of great companies like Standard Oil, Bell Telephone and Ford Motor.

The fake salesman usually puts a time limit upon his offer. The legitimate investment awaits your own convenience.

Not everybody who uses these methods is necessarily a faker—but every faker uses them. The safest rule of all is never to buy any stock that is being peddled.

DENTAL CORPS

Army. Major Chester Denham from duty in Hawaiian Department to duty at Fort Howard, Md.—Army and Navy Register, July 5, 1924.

Major Raymond W. Pearson from duty at Fort Monroe, Va., Sept. 15 to Washington for duty in the Army dispensary.—Army and Navy Register, June 28, 1924.

Major Oscar G. Skelton from duty with 2d medical regiment, Fort Sam Houston, Tex., July 1 to Fort Leavenworth, Kan., for duty.

Major Leigh C. Fairbank from duty at command and general staff school, Fort Leavenworth, Kan., July 1 to Fort Sam Houston, Tex., for duty.

Major Terry P. Bull from duty at William Beaumont General Hospital, El Paso, Tex., July 1 to duty at Fort Sam Houston, Texas.

Major Brantley I. Newsom from duty at Fort Sam Houston, Tex., July 1 to El Paso, Tex., William Beaumont General Hospital, for duty.

Captain Clyde W. Scogin from duty at Fitzsimons General Hospital, Denver, Colo., July 1 to Army dispensary, Washington, for duty.—Army and Navy Register, June 14, 1924.

Colonel Robert T. Oliver, from duties in office of surgeon general, Washington, June 30, to duty in 2d corps area laboratory, New York City.

Lieutenant Colonel Rex H. Rhoades, from duties as professor of military science and tactics, Northwestern Dental School, Chicago, to Washington and report to surgeon general for duty in his office.

Lieutenant Colonel Frank L. K. LaFlamme, orders from duties at Military Academy, West Point, N. Y., to duty as attending dental officer at Boston revoked.—Army and Navy Register, June 21, 1924.

Announcements

CALENDAR OF MEETINGS

NATIONAL SOCIETIES

American Academy of Periodontology, October 7-9, 1924, Atlanta, Georgia.

American Association of Dental Schools, March, 1925, Chicago, Illinois.

American Dental Assistants' Association, November 10-14, 1924, Dallas, Texas.

American Dental Association, November 10-14, 1924, Dallas, Texas.

American Dental Trap Shooters' Association, November 10, 1924, Dallas, Texas.

American Society of Dental Radiographers, November 7 and 8, 1924, Dallas, Texas.

Canadian Dental Association, August 4-7, 1924, Vancouver, B. C.

Delta Sigma Delta, November 10, 1924, Jefferson Hotel, Dallas, Texas.

Dental Protective Association of the United States, 4:00 p. m., December 15, 1924, Palmer House, Chicago, Illinois.

Federation of American Women Dentists, November 10-12, 1924, Dallas, Texas.

Federation Dentaire Internationale, August 6, 1924, Luxemburg.

National Alumni Chapter, Psi Omega Fraternity, November 10, 1924, Southland Hotel, Dallas, Texas.

National Association of Dental Examiners, November 10, 11, 1924, Dallas, Texas.

STATE SOCIETIES

National Capital, at Washington, D. C., first Tuesday of every month.

September

Maryland, at Frederick (22-24).

October

New York Society of Orthodontists, New York City (8).

Susquehanna, at Wilkes-Barre (21-23).

November

American Dental Association, at Dallas (10, 11, 12, 13, 14).

Arizona, at Phoenix.

Texas, at Dallas (10, 11, 12, 13, 14).

December

Ohio, at Dayton (2, 3, 4).

January (1925)

Chicago Dental Society, Chicago (21-23).

February (1925)

Minnesota, at Kenwood Armory, Minneapolis (10-13).

May (1925)

Pennsylvania, Reading (5-7).

MEETINGS OF STATE BOARD OF DENTAL EXAMINERS

New Jersey, at Trenton, December 1, 1924. Secretary, John C. Forsyth, 429 E. State Street, Trenton, New Jersey.

DELTA SIGMA DELTA FRATERNITY

The Fortieth Annual Meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held in the Jefferson Hotel, Dallas, Texas, Monday, November 10, 1924, at 9:30 a. m. The regular order of business will be carried out both at morning and afternoon sessions, to be followed by the initiatory exercises in the afternoon. All of our activities as far as possible will take place in the abovementioned hotel. Information as to the place for holding the annual banquet in the evening will be announced at the morning session. To avoid delay in registration, please present your membership card. Those expecting to attend should promptly notify Dr. Leonard C. Snowden, 604 Southwestern Life Building, Dallas, Texas.

By order of the Supreme Chapter.

L. L. DAVIS, *Supreme Grand Master.*

R. HAMILL D. SWING, *Supreme Scribe.*

AMERICAN ASSOCIATION OF DENTAL SCHOOLS

The annual meeting of the American Association of Dental Schools will be held in Chicago the latter part of March, 1925.

DeLos L. Hill, *Secretary,*
612 Grant Building, Atlanta, Ga.

AMERICAN DENTAL ASSISTANTS' SOCIETIES

All dental assistants' societies are urged to communicate with the undersigned as soon as possible in order that arrangements may be completed making it possible for every dental assistants' association to have a voice in the organization of the American Dental Assistants' Association at Dallas, Texas, November 10-14. An outline of plans will be sent to all societies responding to this request.

Juliette A. Southard, *Chairman,*
174 West Ninety-Sixth Street, New York City.
Jessie C. Ellsworth, *Vice-Chairman,*
30 North Michigan Avenue, Chicago, Ill.

HOSPITALITY HEADQUARTERS OF THE AMERICAN DENTAL ASSOCIATION

Hospitality headquarters for the visiting women to the American Dental Association Meeting will be maintained at the Adolphus Hotel by the Women's Auxiliary to the Dallas County Dental Society. The members will act as hostesses.

Mrs. Oscar E. Busby, *Chairman,*
Entertainment Committee.
Dallas, Texas.

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO

Annual Practitioners' Course

The Board of Directors of the Royal College of Dental Surgeons will conduct an intensive practitioners' course in the College Building, Toronto, from Monday, September 15 to Saturday, September 20, 1924. The following subjects will be presented: anesthesia and oral surgery; crown and bridge work; partial denture; operative dentistry; pathology and periclasia; preventive dentistry; orthodontia; full denture. A cordial invitation is extended to all ethical practitioners. The course will be complimentary to all teachers in dental colleges; for others, the fee will be $25.00.

Further particulars and time table may be had by addressing

Royal College of Dental Surgeons,
240 College St., Toronto, Canada.

CHICAGO DENTAL SOCIETY ANNUAL CLINIC AND MEETING

The midwinter clinic and meeting of the Chicago Dental Society will be held at the Drake Hotel, January 21-23, 1925. A splendid program is in preparation which will equal, or perhaps surpass, any of the previous efforts of the society. All members of the American Dental Association are cordially invited and are most welcome.

Information may be secured from any of the following chairmen: Charles W. Freeman, 25 East Washington Street, Program Committee; F. G. Conklin, 523 South Crawford Avenue, Clinic Committee; Hugo G. Fisher, 25 East Washington Street, Exhibit Committee. Hotel reservations should be made direct with the particular hostelry preferred. The Drake Hotel will, of course, be most convenient. The customary reduced railroad rates will be available.

For general information, address

M. M. Printz, *Secretary,*
25 East Washington Street, Chicago.

THE NEW YORK SOCIETY OF ORTHODONTISTS

The fall meeting of the New York Society of Orthodontists will be held the afternoon and evening of Wednesday, October 8, at the Hotel Vanderbilt, Park Avenue, corner Thirty-Fourth Street, New York City.

William C. Fisher, *Secretary,*
501 Fifth Avenue, New York City.

STATE BOARD OF REGISTRATION AND EXAMINATION IN DENTISTRY OF NEW JERSEY

The State Board of Registration and Examination in Dentistry of New Jersey will hold its regular examination at Trenton, N. J., Dec. 1, 1924. The license fee will be $25; reexamination fee, $10.

Practical tests required are: 1. Insertion of an approximal gold filling with the approximating tooth in position, compound approximal amalgam filling and a silicate filling. The candidate must furnish his own patient. 2. Taking of impressions, bite, selection of teeth, articulation, trial plate. The candidate must furnish his own patient. 3. Practical examination in mouth diagnosis.

Attention is directed to the following quotation from the dental law of New Jersey: "Applicant shall present to said board a certificate from the commissioner of education of this state, showing that before entering a dental college, he or she had obtained an academic education consisting of a four-year course of

study in an approved high school or the equivalent thereof."

In accordance with this law, the secretary will issue application blanks only on presentation of the required certificate from the commissioner of education, State House, Trenton, N. J.

The Board announces a new rule which goes into effect in December. Hereafter candidates are to be given the privilege of appearing at four examinations (one examination and three reexaminations) extending over a period of three years. If the candidate is not eligible for a license after these four examinations, he is then required to take all of the subjects over again and on a further failure to secure a license after four more examinations extending over a period of three more years, that candidate shall be declared ineligible for any further examinations.

Application must be filed, complete, ten days before the date of the examinations.

Address all communications for further particulars to

JOHN C. FORSYTH, *Secretary,*
429 East State Street, Trenton, N. J.

DALLAS

Convention visitors will be interested in the amusement facilities of Dallas. The city has thirty-six theaters, with a combined seating capacity of 28,000. Visitors will be shown, in a spin over the 200 miles of paved streets, some of the parks and playgrounds, which cover 3,800 acres. Dallas has eight golf courses completed and two under construction. Five of these are 18-hole courses at the five local country clubs, and visitors who like golf should by all means bring along their favorite "sticks."

Among points of interest in Dallas are the following:

Dallas-Oak Cliff Viaduct, 5,840 feet in length; said to be the world's longest concrete viaduct; Jefferson and Young streets.

Smokestack of the Dallas Power and Light Company, 350 feet high, sixth tallest chimney in the world; in the industrial district just north of McKinney Avenue.

Medical Arts Building, second tallest concrete building in the country; Pacific and St. Paul streets.

Magnolia Building, tallest building in the South, and but two taller in the country outside of New York; 402 feet above street. The public is admitted to the observation gallery free certain hours in the afternoon; Commerce and Akard streets.

Fair Park, 150 acres, home of the Nation's greatest annual fair, with attendance around 1,000,000; Exposition and Parry avenues.

Dallas Zoo, in Forest Park, Oak Cliff at Marsalis and Crawford streets.

White Rock Lake and Reservoir, covering 2,500 acres; boating, fishing and camping; follow Grand Avenue east.

Backman Reservoir and Park, boating, fishing and camping; follow Maple Avenue Road, north.

Municipal Golf Course, 18 holes, between Haskell and Fitzhugh streets, at H. & T. C. Railroad.

Lakewood Country Club (members only), in Munger Place.

Dallas Country Club (members only), in Highland Park.

Scottish Rite Cathedral, Dallas, Texas.

Brook Hollow Country Club (members only), North Dallas.

Cedar Crest Country Club (members only), Trinity Heights.

Glen Haven Country Club (members only), Richardson Pike.

City Park, oldest park in the city, on Ervay street between Pocahontas and Eakins streets.

Munger Place, in East Dallas, exclusive residential district.

Highland Park, suburb to north of city, exclusive homes and estates.

Southern Methodist University, Highland Park.

Dallas University, Oak Lawn.

Baylor University, departments of medicine, pharmacy, dentistry and nursing, east Dallas.

Love Field, site of Municipal Aviation Landing Field, Dallas Textile Mills and other factories, north of Dallas between Lemmon and Maple Avenue roads.

Radio Broadcasting Stations, Dallas News, City Hall and Automotive Electric Company.

West Dallas, site of cement factories, oil refineries and other industries.

South Dallas industrial district, site of one

of the world's largest concrete cotton warehouses, 100,000-bale capacity; $3,000,000 Proctor & Gamble Factory, Dallas Cotton Mills, packing house, casket factories, oil field machinery, foundry and other industries.

The Chamber of Commerce maintains a convention department, which is working in close harmony with the convention committee of the local dentists in an effort to make the stay of the visiting dentists most pleasant and profitable. Dallas people will put our city at the disposal of the visitors, and southern hospitality, western courtesy and chivalry will be blended in your welcome and treatment.

INFORMATION WANTED

Dr. Orgyris Nicholaides graduated from the Philadelphia Dental College in 1914, aged about 26. His preceptor was Dr. Guilford. Dr. Nicholaides was last heard from in New York, six or seven years ago. Any information that can be obtained concerning him will be gratefully received by his mother and his brother. Address: Dr. N. D. Nicholaides, 8 Hippocrates, Athens, Greece.

RESOLUTION ADOPTED BY THE DENTAL SOCIETY OF THE STATE OF NEW YORK*

Rochester, N. Y., June 12, 1924.

Dr. Otto U. King, Secretary,
American Dental Association,
5 North Wabash Avenue,
Chicago, Illinois.

Dear Sir:

At the fifty-sixth annual meeting of the Dental Society of the State of New York, held in Binghamton, May 7-10, 1924, the executive council of that body passed the following resolution, which I have been instructed to submit to you:

WHEREAS, By untrue and unfair advertising certain proprietary preparations are being sold to the public by druggists and general storekeepers, as harmless cleansers of teeth, teeth bleaches, stain removers, tartar solvents and teeth whiteners; and

WHEREAS, Such certain proprietary preparations work injury to the enamel of the teeth, causing disintegration and are, therefore, destructive to the teeth and subversive to the general health; be it

Resolved, That the Dental Society of the State of New York authorizes, empowers, and instructs the president to appoint a committee to present information to the Commissioner of Health of the State of New York, with the request that any and all teeth bleaches and teeth stain removers so sold and advertised to the public as harmless be investigated by the proper health officers of this state; and be it further

Resolved, That a copy of this resolution be forwarded to the Commissioner of Health of the State of New York, to the President of the American Dental Association, the Board of Examiners of the State of New York, the presidents of the various dental societies in the State of New York, the Pure Food and Drug Section of the Department of Agriculture of Washington, D. C., the Postmaster General and all reputable dental journals.

Very truly yours,

GERALD G. BURNS,
Secretary, Executive Council.

*Similar resolutions have been received from the Pennsylvania State Dental Society and various other organizations. The March issue of The Journal (page 279) contains an editorial "Tooth Cleansing and Bleaching Agents," bearing on the subject of these resolutions.

NEW BOOKS RECEIVED FOR THE LIBRARY OF THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

The Journal of the American Dental Association promptly acknowledges herewith the receipt of new publications. Books selected from those named on this list are reviewed below. Reviews are matter-of-fact statements of the nature and contents of the publication referred to and are intended *solely to guide possible purchasers.*

The Story Series in Health—Book Two: The Boys and Girls of Wake-Up Town. By J. Mace Andress, Lecturer on Health Education, Boston University. Illustrated by Marguerite Davis. Boston: Ginn and Company, 1924. Pp. 218.

RECENT HEALTH PUBLICATIONS

Report on the Present Status of Knowledge of Accessory Food Factors (Vitamins). Compiled by a committee appointed jointly by the Lister Institute and Medical Research Council (Great Britain). Medical Research Council Special Report Series No. 38 (Revised). His Majesty's Stationery Office, London, 1924.

This report gives a summary of the essential facts concerning vitamins, so far as they are at present known, reviewing past research in this field and also including data on new experiments which have special relation to the effect of food factors in the prenatal period on the formation of teeth.

DENTAL HEALTH EDUCATION

LIST OF NONTECHNICAL AND TECHNICAL DENTAL FILMS*

Nontechnical Dental Films

1. Come Clean—2 reels
   Original producer—U. S. Army
   Distributor—University of Wisconsin
   Community Motion Picture Service, Inc., 6 West Twenty-fourth Street, New York City, Army Medical Museum
   Price—Rental—University of Wisconsin, Transportation charges only in state; $1.50 a day per reel outside state.
   Community Motion Picture Service, $4.00 a day.
   Army Medical Museum—Transportation charges
   Synopsis—Shows soldier the importance of strict mouth hygiene.
2. Dental Hygienist, The—1 reel
   Original producer—Dr. A. C. Fones, Bridgeport, Conn.
   Distributor—Hygiene Film Company, 10 Washington Ave., Bridgeport, Conn.
   Price—Rental—$10.00 a day
   Sale—$25.00
   Synopsis—Shows school where women are trained to serve children in dental clinics; their activities.
3. Fair Day, A
   Original producer—American Red Cross
   Distributor—Society for Visual Education, 327 South La Salle St., Chicago, Ill.
   Price—Rental—$2.00 a day
   Sale—Price quoted on request
   Synopsis—The Golucky family visits the country fair. In the dental booth, the teeth are examined; family learns of foods that build good teeth and how to care for teeth.
4. Good Teeth—Good Health—2 reels
   Original producer—Colgate & Co., New York
   Distributor—Colgate & Co., New York City
   Price—Rental—Free
   Synopsis—Care of the teeth. Mother takes children to zoo as object lesson. Dentist shows proper methods of caring for teeth.
5. Good Teeth Mean Good Health—½ reel
   Distributor—American Motion Picture Corp., 71 West Twenty-third Street, New York City
   Price—Rental—$3.00 a day
   Synopsis—Demonstrates the importance of good teeth as they relate to the health of the individual.
6. Home Care of the Mouth—1 reel
   Original producer—Dr. A. C. Fones, Bridgeport, Conn.
   Distributor—Hygiene Film Company, 10 Washington Ave., Bridgeport, Conn.
   Price—Rental—$10.00 a day
   Sale—$125.00
   Synopsis—Gives in detail methods of brushing; close-ups of good and bad teeth.
7. Home Prophylaxis
   Original producer—Dr. M. L. Rhein, New York
   Distributor—Eastern Film Corp., 220 West Forty-second St., New York City
   Price—Rental—$10.00 a day
   Synopsis—Title explanatory.

*Innumerable lists of dental films have been published, each of which is incomplete. Although motion picture producers and distributors were thoroughly circularized in the compilation of this list, there are doubtless discrepancies and omissions. Therefore, any corrections and additional information will be appreciated, after which the list will be revised and reprints will be available. The American Dental Association has not reviewed the films listed, nor does it approve or disprove any. The aim was to assemble all possible information concerning dental motion pictures. Kindly address communications to Department of Dental Health Education, American Dental Association, 5 North Wabash Ave., Chicago, Ill.

8. How Are Your Teeth—½ reel
   Distributor—American Motion Picture Corp., 71 West Twenty-third St., New York City
   Price—Rental—$3.00 a day
   Synopsis—Necessity for care of the teeth; instructions.
9. King Arthur's Castle—1 reel
   Original producer—Dr. Thomas B. McCrum, Kansas City, Mo.
   Distributor—Dr. Thomas B. McCrum
   Price—Rental—$5.00 a day and express charges
   Synopsis—For school use; shows children the fundamental factors and value of a healthy mouth.
10. Mouthful of Wisdom, A—1 reel
    Original producer and distributor—Dentinol Pyorrhocide Co., 1480 Broadway, New York City
    Price—Rental—Free to educational institutions
    Synopsis—Shows how pyorrhea develops, how it is treated; the eruption of teeth, relationship between deciduous and permanent teeth.
11. Oral Hygiene—2 reels
    Distributor—General Vision Company, 342 Madison Ave., New York City
    Price—Rental—$7.00 a day
    Synopsis—Shows results of neglect of teeth; benefits of mouth hygiene; animal pictures show method of mastication.
12. Mouth Hygiene for School Children—½ reel
    Original producer—Dr. A. C. Fones, Bridgeport, Conn.
    Distributor—Hygiene Film Company, 10 Washington Ave., Bridgeport, Conn.
    Price—Rental—$10.00 a day
    Synopsis—Shows work of dental hygienists in clinics for children; includes toothbrush drills, classroom talks, etc.
13. Stone Age Dentistry
    Distributor—Celebrated Players Film Corp., 810 South Wabash Ave., Chicago, Ill. (Distributed in state of Illinois only)
    Price—Rental—$5.00 a day
14. Tommy Tucker's Tooth—1 reel
    Original producer—Dr. Thomas B. McCrum, Kansas City, Mo.
    Distributor—Dr. Thomas B. McCrum, 105 Hunter Ave., Kansas City, Mo.
    Price—Rental—$5.00 and expressage one day; $6.00, two days; $2.00 for each additional day.
    Sale—$60.00 regular stock; $70.00 noninflammable stock
    Synopsis—The "Tell-a-story-lady" narrates to a group of children the importance of keeping teeth in good condition. Animated scenes used effectively.
15. Your Mouth—1 reel
    Original producer—Dr. Edwin N. Kent, Boston, Mass.
    Distributor—United Cinema Co., 120 West Forty-first St., New York City
    Price—Rental—$5.00 a day
    Sale—$100.00 a reel, regular stock; $115.00 noninflammable stock
    Synopsis—Gives the cause, progress and results of tooth decay; methods of prevention; brings in nutritional aspect, use of roentgen ray, brushing, etc.
16. Your Teeth
    Distributor—Central Dental Laboratory, 218 South Wabash Ave., Chicago, Ill.
    Price—Rental—$10.00 for one or two days; $5.00 for each additional day
    Sale—$100.00
    Synopsis—Shows care that should be given teeth.
17. X-Ray on Teeth, An—¼ reel
    Original producer—Life Extension Institute
    Distributor—Bray Productions, Inc., 130 West Forty-sixth St., New York City
    Price—Rental—$2.50 a day
    Synopsis—Shows by roentgen ray infected tooth sockets; how they affect health and the importance of care of teeth.

TECHNICAL DENTAL FILMS

1. A Simplified Method of Removable Bridgework, Using the Yirikian Attachment
   (a) Pulp Devitalization and Removal Under Local Anesthesia.
   (b) Root Filling, Including Ionization.

(c) Cavity Preparation, Impressions and All Laboratory Steps in Detail.
Distributor—Eastern Film Corp., 220 West Forty-second St., New York City.
Price—Rental—$10.00 per showing
Original producer—Dr. Joseph N. Levy.

2. Angle's Original Method of Taking Impression
Distributor—Same as above.
Price—Rental—$10.00 per showing.
Original producer—Dr. Edward H. Angle.

3. Apicoectomy; Amputation of Root
Distributor—Same as above
Price—Rental—Same as above
Original producer—Dr. Adolph Berger

4. Apicoectomy; Amputation of Root
Distributor—Same as above
Price—Rental—Same as above
Original producer—Dr. Joseph M. Levy

5. Application of Angle's New Ribbon Arch Appliance for Correction of Malocclusion
Distributor—Same as above
Price—Rental—Same as above
Original producer—Dr. Edward H. Angle

6. Dental Hygienist, The (in three parts)
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. Alfred C. Fones

7. Dental Prophylaxis (in four parts)
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. Alfred C. Fones

8. Extraction of Teeth Under Nitrous Oxid Anesthesia
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. J. V. Thomas

9. Fracture of Jaw, Repair of
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. Adolph Berger.

10. Gold Foil Filling,—Insertion of a Non-Cohesive (Cylinder Method and Hand Pressure)
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. Edwin T. Darby

11. Method of Brushing Teeth
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. M. L. Rhein.

12. Periodontia Clinic, Prophylaxis for Pyorrhea
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. Paul R. Stillman

13. Pyorrhea Extermination (Gingivo-Ectomy)
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. William Ziesel

14. Removal of Cyst
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. A. Berger.

15. Root Amputation and Immediate Root-Filling
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. R. W. Waddell.

16. Root-Canal Filling, Technique of Aseptic
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. R. Ottolengui.

17. Root technique
Distributor—Same as above. Price—Rental—Same as above
Original producer—Dr. M. L. Rhein

18. Technic for Making Impressions and Models for the Construction of Artificial Dentures.
Distributor—Dr. W. A. Giffen, 905 Stroh Bldg., Detroit, Mich.
Original producer—Dr. W. A. Giffen, 905 Stroh Bldg., Detroit, Mich.

A Chinese Idea of Efficiency

By ERNEST V. MADISON

EFFICIENCY is a word widely used in these days. Sometimes, however, its application differs with geographic location.

As an illustration, we have been told that in China few seats are found in the movie theaters. The managers want their audiences to stand, their houses thus having a larger capacity. If seats were furnished, many of their patrons would remain all day, but in standing they eventually tire and leave, making room for other admissions.

Can you imagine the brevity of existence of a movie theater in New York, Chicago, Cincinnati or Memphis operated by Chinese efficiency methods.

* * * *

Buying efficiency, however, has but one application the world over. It is in getting the greatest possible value for money spent.

* * * *

It pays to buy advertised products. We get more for our money. Refer to those advertised in this issue of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION.

By so doing, we obtain products far above the ordinary; which have been made so good that the manufacturers dare risk on them the honor of their names. These manufacturers go on record by printed word that the product will be found of good quality and will give service and satisfaction.

If there were no other reason why we should follow the advertisements in this journal, there would be the sufficient one that the knowledge thus obtained aids us in making every buying dollar do a more efficient work.